TEN DOLLARS PER YEAR • ONE DOLLAR PER COPY

World Petroleum

E OF CONTENTS PAGE 27

DECEMBER 1956

How Cameron helps keep down the high cost of *SLUSH PUMP UPKEEP*

Cameron Shear-Relief Valves are available in 2" and 3" sizes; pressure setting ranges from 125 lbs. to 5000 lbs.

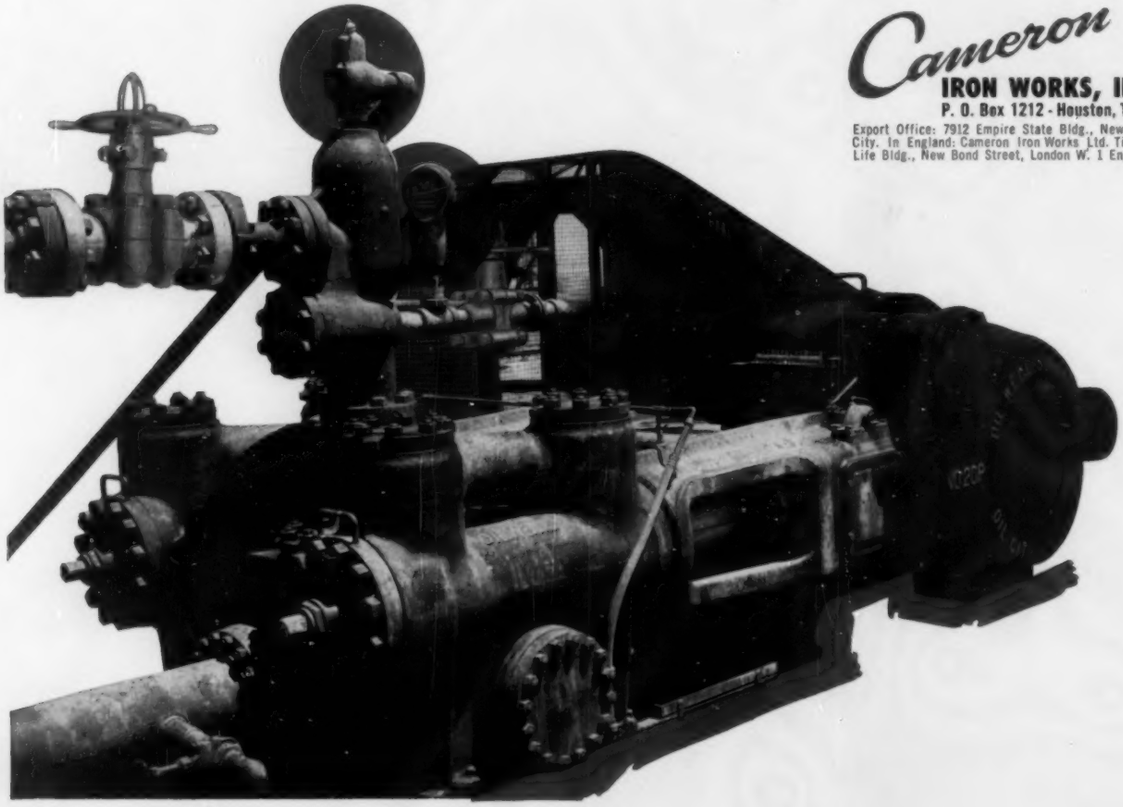
Cameron Mud Line Pressure Gauges are available in 2" size; pressure range from 1000 psi to 15,000 psi.

Slush pumps, mud manifolding, and rotary hoses are not guaranteed against excessive pressures. But you can prevent damage to them with these two Cameron safeguards: the Shear-Relief Valve and the Mud Line Pressure Gauge.

The Cameron Shear-Relief Valve may be set to open automatically at any predetermined line pressure. A common nail shears, the valve opens, and excessive pressure is relieved. No damage to anything but the nail! Money can't buy lower cost, more dependable insurance against damage to your mud system.

The Cameron Mud Line Pressure Gauge has made all other types of gauges obsolete for mud line service. Its movement is encased in a special light oil that damps pump pulsations and rig vibrations. A glance at its big steady dial tells you the exact pressure on the mud line. No guesswork.

To help keep drilling rig maintenance at a minimum, make sure that these proven Cameron safeguards are working for you.

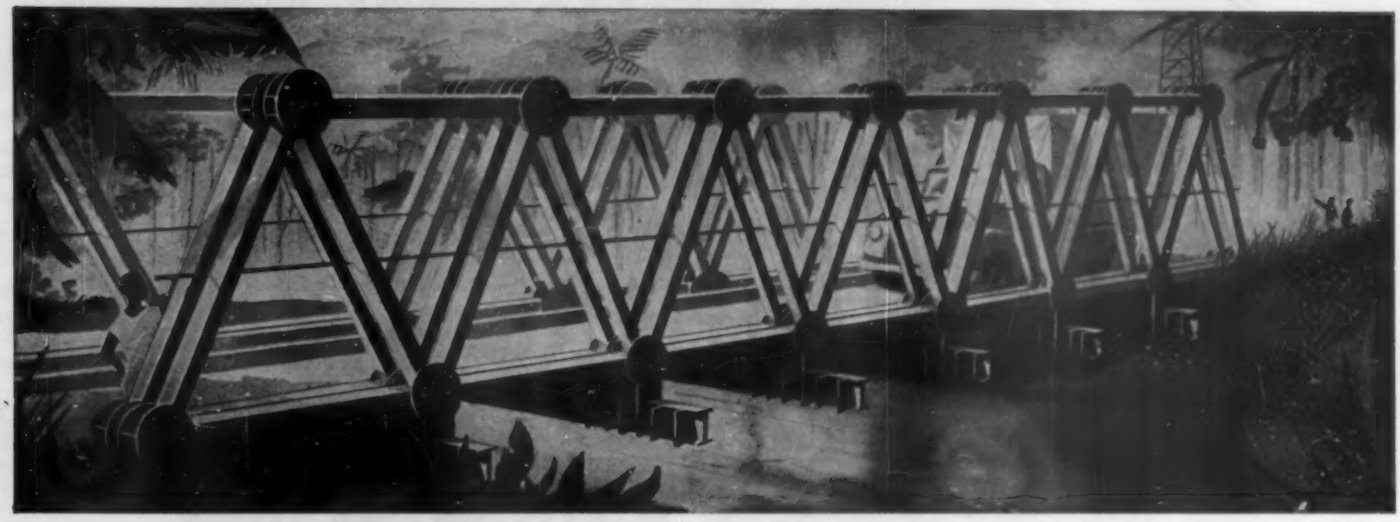


Cameron
IRON WORKS, INC.
P. O. Box 1212 - Houston, Texas

Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd. Time & Life Bldg., New Bond Street, London W. 1 England.

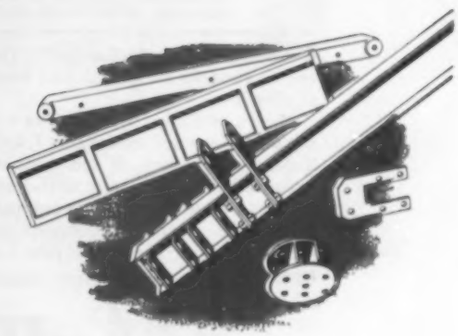
Easily transported to . . .

and quickly erected on . . .



remote up-country sites

Butterley Standard-Unit Bridges are in use all over the world where transport is difficult, skilled labour scarce or where site preparation has to be carried out under adverse conditions. From five standard units, all sizes of bridges can be built; the units can be sent by any form of transport; site erection is remarkably simple and swift with an absolute minimum of equipment.



THE BUTTERLEY *STANDARD-UNIT BRIDGE*

THE BUTTERLEY COMPANY LIMITED RIPLEY DERBY ENGLAND

London Office: 9 UPPER BELGRAVE STREET S.W.1.

Over
60
Locations in the United States and Canada

McCullough®
REPORTS
TO THE OIL INDUSTRY

Service
Anywhere Anytime

New Services • • • New Tools • • • New Methods • • • Outstanding Results

McCullough Back-off Service Simplifies Fishing Job

Enables Fastest Possible Recovery of Cemented-in Tubing String

While this wildcat was being completed, a packer and 2½" tubing were cemented in the 7" O.D. casing by error. The productive sand which was to be tested lay at 7,660'

Faced with a tough pipe recovery job, the operator called for McCullough Back-Off Service. The Magna-Tector was run and located the lowest free point at 7,449' and the nearest collar that could be backed off at 7,430'. The entire zone to be tested had been cemented-in.

Next, a McCullough String Shot was run which loosened the collar at 7,430'. Tubing was backed off and removed from the well. The balance of the tubing was washed-over and cut out, permitting the operator to complete his well program in the fastest possible time.

The entire back-off job was completed in only three hours rig time and was done in 25° below zero weather.

Due to the accuracy and reliability of McCullough Back-Off Service, all free tubing was recovered on the first try. Also, the balance of the fishing job was minimized to the point where it could be completed with the least possible expense and loss of rig time to the operator.

RECOVER ALL FREE PIPE ....

When pipe is stuck, call for the McCullough Magna-Tector (Free Point Finder). Locates lowest free point, accurately and in a hurry. Paves the way for fast recovery of all free pipe and speeds up remaining fishing operations. You save money, rig time and recover more pipe.

Magna-Tector Helps Recover An Extra 3680' of Casing

McCullough Magna-Tector and Jet Casing Cutter Slash Abandonment Costs by Recovering 61% More Casing Than Expected

Substantial savings were realized by this Wyoming operator in the abandonment of an 11,000' well. McCullough's Magna-Tector accurately located the stuck point, indicated that the pipe might be freed to greater depths, then confirmed the progressive loosening of the string as the pipe was worked.

Casing was 7" O.D. 29 lb. N-80. A temperature survey located the top of the cement at 7,550'. The operator was expecting to recover a maximum of 6,000' of casing and called McCullough to exactly locate the lowest free point at which it could be cut.

On the first run of the operation, the Magna-Tector found the casing stuck at 5,000' and cutting the pipe at that depth was considered. However, since the Magna-Tector indicated that the casing might be freed still deeper by working, the operator decided to give it a try.

The pipe was worked for two hours. Periodic checks by the Magna-Tector showed the casing was loosening progressively deeper, until finally the string was free at 9,700'.

A 7" McCullough Jet Casing Cutter was run and the cut made at 9,680'. Total rig time on the job was only six hours.

Guesswork in pipe recovery operations is entirely eliminated by the use of the McCullough Magna-Tector (Free Point Finder). It quickly and accurately locates the lowest free point from which pipe may be recovered. It may also, as in this case, indicate that working the pipe will free it to greater depths.

A bonus of an additional 3,680' of useable 7" N-80 casing was no small saving on this job.

McCullough® *TOOL COMPANY*

Cable Address: MACTOOL

LOS ANGELES
HOUSTON
EDMONTON

WORLD PETROLEUM FOR DECEMBER, 1956, Vol. 27, No. 13, December, 1956. WORLD PETROLEUM is published monthly by Mona Palmer, Trustee under the will of Russell Palmer, 604 Fifth Ave., New York 20, N. Y. Accepted under Section 34.64 P.L.&R. at Bristol, Conn. Subscription rate: $10.00 per year, single copies $1.00. Copyright 1956, by Mona Palmer, Trustee.

From Regina to Saudi Arabia

B-L VESSEL LININGS SET RECORD AFTER RECORD FOR DEPENDABLE PERFORMANCE

It looks like a Cook's Tour—but it isn't. Instead it's a listing of recent Bigelow-Liptak refinery installations in far-flung corners of the world.

There are good, solid reasons for this world-wide preference for Bigelow-Liptak jobs. In the first place from B-L's years of experience has come a complete castable package. Insulating- and abrasion-resistant castables are engineered, furnished and installed by the same company—which means just one contract and one responsibility.

The overall result of this all-in-one engineering is exceptional durability and performance. B-L refractory installations have established world records for continuous operation. For example, after initial runs of 785 and 610 days, B-L linings were in perfect shape—required no repairs during shutdowns.

Yes, from Regina to Saudi Arabia—and points in between—Bigelow-Liptak installations are setting new records for service and performance. For complete information write for the B-L catalog "One Source". Do it today!

A FEW OF OUR RECENT JOBS

Montreal, Canada	Regenerator
Regina, Canada	Regenerator and Cyclones
Batangas, Philippines	Regenerator and Cyclones
Yokohama, Japan	Regenerator and Cyclones
Ras Tanura, Saudi Arabia	Regenerator—Reactor
Copenhagen, Denmark	Kiln-Reactor
Antwerp, Belgium	Kiln
Norco, La.	Regenerator and Cyclones
Altona, Australia	Reactors
Mandan, North Dakota	Regenerator and Cyclones
Anacortes, Washington, U.S.A.	Regenerator, Reactor, Cyclones and Lines.

BIGELOW-LIPTAK *Corporation*

AND BIGELOW-LIPTAK EXPORT CORPORATION
2550 WEST GRAND BOULEVARD, DETROIT 8, MICHIGAN

UNIT-SUSPENDED WALLS AND ARCHES

In Canada: BIGELOW-LIPTAK OF CANADA, LTD., *Toronto, Ontario*

ATLANTA • BOSTON • BUFFALO • CHICAGO • CLEVELAND • DENVER • HOUSTON • KANSAS CITY, MO. • LOS ANGELES • MIAMI • MINNEAPOLIS • NEW YORK • PHILADELPHIA • PITTSBURGH • PORTLAND, ORE. • ST. LOUIS • ST. PAUL • SALT LAKE CITY • SAN FRANCISCO • SEATTLE • TULSA • MONTREAL • SAULT STE. MARIE, ONT. • VANCOUVER • WINNIPEG

and Now! ---- CARTAGENA, COLOMBIA

All of the castable refractories required for a complete cat cracker—including a regenerator and reactor and the interconnecting lines—will be furnished by Bigelow-Liptak for a job now going up at Cartagena, Colombia. In addition, B-L will furnish erection help and supervision.

Washington PIPE LINE

By Joseph B. Huttlinger

American oil and gas executives are keeping their fingers crossed as the U. S. Congress cranks up for another seven-month session starting in January.

Among many business leaders there's a feeling that, "Ike's back, and all's well with Washington." This is less true in oil and gas.

Granted, the bulk of oil and gas leaders are pleased with the return of President Eisenhower for another four years. Granted, they spent money to help him. Yet, they have reservations.

After all, Ike is the man who vetoed the natural-gas bill this year, after giving the broadest hints he would sign it. And Ike is the man who has refused to say whether he's for the depletion provision for oil and gas of 27.5%. Further, Ike's Defense Department has been trying to grab up more lands for naval oil reserves, and is making hints it would like to have Texas' tidelands beyond three miles. Under Eisenhower, further, the U. S. has been pressing the greatest anti-trust program in decades, if not in the history of the country.

Despite all this, Mr. Eisenhower has been kind to aims of oil and gas, as shown by actions in the matter of tidelands, sale of government rubber plants, and general policy on political and economic matters. So it is not surprising many oil men were for him vigorously. And many others were for him because they preferred him to the other candidate, Adlai Stevenson. On most oil and gas matters, they felt, Mr. Stevenson would be worse.

In one sense, the outcome of the election is the best that could have come, granted the choices on the day of election. In the White House comes a man as friendly as politically possible to oil and gas and business in general. In both chambers of Congress comes control by Democrats. While a number of "get oil" measures will be sponsored by some in Congress, the leadership of both chambers is in the hands of two friends of oil—House Speaker Sam Rayburn and Senate Majority Leader Lyndon Johnson, both of Texas.

As it stands, the two major matters about oil and gas due to come up in Washington are chiefly in the hands of the White House. These are a gas bill, and oil imports.

If things go as expected, President Eisenhower is expected to suggest legislation in the coming year to set forth the standards for price and other controls over independent producers of natural gas. Only after the President speaks, either directly or through some officer close to cabinet rank, will the Congress move. Any bill carrying the President's clear-cut endorsement will have a good chance of passing in Congress. And, in such a case, a presidential veto is impossible. Unless the President takes the lead, there will be no gas bill.

The clamor against excessive imports of crude oil, if it is revived during the session, also is up to the President first. Under legislation extending the Reciprocal Trade Agreements Act, the President must watch the situation. If he finds imports are a threat to national security, he must take some action. Though he might ask Congress for advice as to the action, the first step is squarely up to the President.

Thus, in two areas at least, the President is the decisive force.

The chief concern of oil and gas lawyers observing Washington lies in what may come from the U. S. Congress in the way of new programs. Although any complete account is impossible, the facts on the record indicate moves will arise along these lines, among others:

(1) To shave down the income-tax depletion allowance for crude oil and gas production now at 27.5%;

(2) To slow down mergers in industry;

(3) To curb military grabs of public lands, and navy plans to create more oil reserves;

(4) To order oil refiners to sell off their interest in gasoline stations—so-called divorcement measures;

(5) To curb price cutting of gasoline, or price discrimination, by major oil refiners and marketers;

(6) To tighten up the rules covering the Interstate Oil Compact, which limits crude-oil output to prevent waste;

(7) To lower income taxes generally, and for foreign business operations specifically;

(8) To launch a one billion tanker construction program.

U. S. Import Picture Changed

One result of the Middle East has been to make academic the once burning and immediate issue of crude-oil imports to the U. S.

Almost overnight, the picture changed. No longer was crude oil moving to the U. S. in more and more volume; instead, the U. S. was seen as the source of crude oil for the free world.

An early response was a decision at the Office of Defense Mobilization to postpone any finding as to the level of imports, and whether they are too high. A December 1 target date for such decision had been set. But Dr. Arthur S. Flemming, defense mobilizer, ruled the Suez crisis must be settled before any stand can be taken.

An ODM finding of this sort would throw the matter to the President. Under the law, he faces the duty of agreeing or not. If he agrees, he would have to take action to keep imports at a lower level, whether by tariffs, quotas, or other methods.

A second result of the crisis was to complete emergency plans to bring 500,000 to 1,000,000 b/d of Gulf Coast crude oil to Europe. A pooling of tankers, and of crude oil and products, is part of the plan. The plan was a "when and if" matter, pending diplomatic developments in the Middle East.

Ultimately the oil-imports matter may be relegated to a backstage role for months to come, if the U. S. is called upon for as much crude oil for Europe as many envision. While U. S. producers will press for formal U. S. and congressional action to limit imports, there may be little steam in the drive in the near future.

Facts of imports matter were argued during three days of hearings starting October 22 before ODM's counsel, Charles Kendall. U.S. producers took one side and oil importers, backed by marketers, took the other.

The oil-imports matter was recognized by the top U. S. officials in the report of a cabinet Committee on Energy Resources Policy. The cabinet committee issued a suggested formula.

The U. S. formula on oil imports, which first was issued February 1955, and then modified to allow in more oil, is both the starting point and a subject of the present study.

The formula, when first issued by the cabinet committee, was a suggestion to oil importers to use voluntary methods to keep imports of crude oil at 10.3% of domestic crude production, and residual oil imports at about 6% of domestic crude output. This was the 1954 ratio. Thus, the formula hitched imports to the level of crude-oil production.

Subsequently, the cabinet committee changed the formula, and announced it in a letter of last May. Now, a five-month restudy of the formula, by a group of industry experts, has resulted in a formula which is exactly the same as that put into effect by the May letter. The restudy findings were announced October 17.

Only about 25% of crude-oil imports to the U. S. from the Middle East and the Far East are under the new formula. It makes an exception for all residual fuel-oil imports. Also, it makes exceptions for crude-oil imports from Canada, from Venezuela, and all imports of crude into District 5, which is the West Coast of the U. S.

"Unless this objective (of holding Middle East imports to 10.3% of domestic production) is realized," said the committee, there will be in the period immediately ahead an impairment of our national security position because there will be an inadequate incentive for exploration and the discovery of new sources of supply.

"The committee believes that the deviation from the above policy reflected in the import programs announced for the third and fourth quarters of 1956 would constitute, if continued into 1957, a threat to our national security."

Specifically, the cabinet committee estimated that U. S. crude-oil production in 1957 would run 5% higher than in 1956, when it came to 7,105,000 b/d. On this basis, the committee asked oil importers to cut their imports from the Middle East to the East Coast by 1% of the January-June 1956 level of 302,600 b/d.

The surprise, if any, in the cabinet committee restudy is a statement that Venezuela will take "appropriate action" to lower her imports to the U. S., except for the imports to the U. S. West Coast, to confom to the formula. It was immediately denied by the Venezuelan government.

Oil Changes in Congress

In Congress there will be changes of importance to oil and gas. Thus, Representative Percy Priest (D., Tenn.) died in October. He steered the gas bill through the House Commerce Committee of which he was chairman. Representative Oren Harris, (D., Ark.) takes over as chairman. He was author of the gas bill.

Senator Herman Welker (R., Idaho) a friend of oil and gas, was defeated by a New Dealer, Frank Church, age 32, Democrat.

Senator Eugene Millikin (R., Colo.) a friend of oil's depletion provision, and the gas bill, did not run. John A. Carroll (Democrat) a New Dealer, was elected to his place.

Senator Price Daniel (D., Texas) was elected Governor of Texas, and his spot is to be filled, either by appointment or state election.

Senator James Duff (R., Penna.) who voted against the gas bill, and for limiting oil imports, was defeated by Joseph S. Clark, (Democrat). Mr. Clark was head of a mayors' committee opposing the gas bill.

Senator Wayne Morse (D., Ore.) critic of the gas bill and the depletion provision, was re-elected over Douglas McKay, first Interior Secretary under President Eisenhower.

Senator Francis Case (R., S.D.) who touched off the furor leading to the gas bill veto by saying he was offered a campaign gift, was returned in a close race.

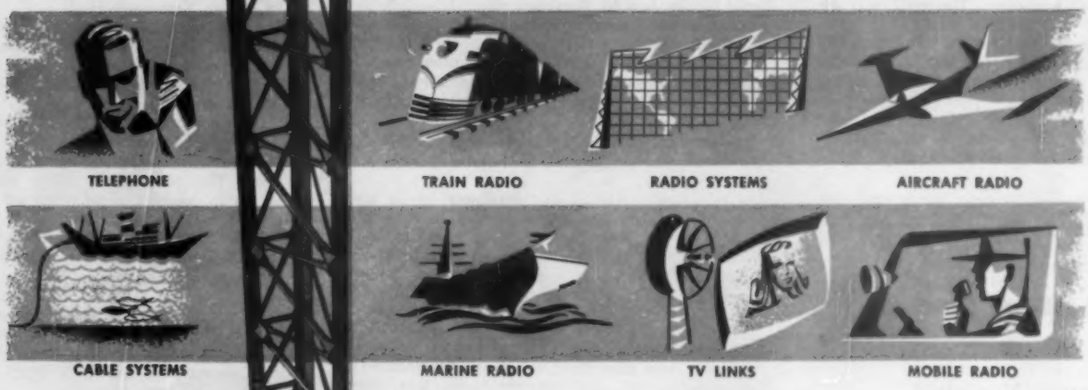
Senators Paul Douglas (D., Ill.) and John Williams (R., Del.) will be back. Both are ardent foes of depletion.

Senator George Bender (R., Ohio) gas bill foe, was defeated by Frank Lausche, independent, who may oppose a gas bill likewise.

Senator Earle Clements (D., Ky.) gas bill supporter, was defeated by Thruston Morton (Republican) whose views are not known.

Behind *Federal* MICROWAVE

—the world's most comprehensive communications experience



Federal, through IT&T's global background in research, engineering, manufacturing and system operation, brings you...

"MICROWAVE AT ITS BEST"

No other microwave system is backed by communications experience so broad and diversified as that of Federal's parent company . . . the world-wide International Telephone and Telegraph Corporation.

IT&T *pioneered* microwave . . . IT&T *knows* communications . . from the simplest inter-office dial telephone system to intercontinental radio and cable companies serving every corner of the earth. This vast, collective experience, covering system *manufacturing* and system *operation*, is the *plus value* you get *only* with Federal Microwave!

Federal is the system especially designed for pipelines, railroads, utilities, telephone companies, municipalities, highways, TV stations and others . . . meeting every need for high-quality operation of communications, supervisory and control functions.

Whatever your distance, terrain or circuit requirements . . . look to Federal for microwave systems of maximum versatility and dependability . . . built by communications experts . . . and *"Certified by a World of Research."*

Write to Dept. H-8136

Federal

A DIVISION OF

IT&T

Federal Telephone and Radio Company
A Division of
International Telephone and Telegraph Corporation
100 KINGSLAND ROAD • CLIFTON, N. J.

Canadian Notes

Largest Canadian Gas Line

The progress of Trans-Canada's construction has tended to overshadow other gas projects; however, the largest natural-gas pipeline system in Canada will be that of Inland Natural Gas Co., Ltd., which will distribute from the West Coast main line through the entire British Columbia interior. Initial mileage of the main line and local system will be 875 miles. Contract has been negotiated with Dutton-Williams Brother, Ltd., of Calgary, and Canada will see the start of construction this fall. Total cost of the line will be at least $28,000,000; initial capacity will be about 50 mmcf per day.

New Canadian Discovery

Another light-gravity oil discovery in southeast Saskatchewan has been reported by Husky Oil & Refining Ltd., operator for the Husky, Consolidated Mic Mac Oils, Ltd. team. It is Husky-Mic Mac-Canadian Superior Douglaston No. 1 located in LSD 13-8-5-4W2. It was drilled to a total depth of 4,496 feet and completed as a flowing oil well from the Charles formation, topped at 4,343 feet. Production was 184 b/d in a six-hour test on a one-quarter inch choke. Gravity of the oil is 33.3 API, with 0.2% water and sediment. The well will be shut in until surface equipment is installed.

Douglaston No. 1 is the fourteenth well completed to date by the team in their program which calls for 25 exploratory ventures. All wells are being drilled on acreage farmed out from Canadian Superior Oil Co. of California, Ltd. Husky and Mic Mac will earn a 50% interest in the 20,480 acres included in the agreement upon completion of the 25 wells.

A. E. Ames & Co.

Limited

Government, Municipal

and Corporation Securities

A. E. Ames & Co.

Members

Toronto Stock Exchange

Montreal Stock Exchange

United States Affiliate:

A. E. Ames & Co. Incorporated

New York • Boston

Business Established 1889

Toronto

MONTREAL WINNIPEG VANCOUVER VICTORIA
CALGARY LONDON OTTAWA KITCHENER HAMILTON
ST. CATHARINES OWEN SOUND QUEBEC LONDON, ENG.

Imperial Continues Saskatchewan Discovery Rate

Imperial Oil Ltd. continued its strong discovery rate in southeastern Saskatchewan through the third quarter. It completed 7 wildcats as oil discoveries, out of 21 wells drilled. In the first half the score was 7 out of 13. Composite results for the three quarters were 14 oil discoveries in 34 wells, for a success ratio of one in 2½.

Federal Board Decides Saskatchewan Pipeline Case

Saskatchewan has won recognition from the Federal Board of Transport Commissioners in jurisdiction over a pipeline construction job within the province. After the provincial government awarded a permit to Trans-Prairie Pipe Lines Ltd. for a small gathering system, the board declined to grant a permit to Westspur Pipe Line Co. for the same line. Divided jurisdiction arose because Westspur's main line crosses a provincial boundary.

Trans-Canada Pipe Lines Has Winnipeg Survey Office

Trans-Canada Pipe Lines Ltd. has set up an engineering and survey office in Winnipeg for the entire line between Moose Jaw and Port Arthur. The company will have four spreads on 34-inch from Moose Jaw to Winnipeg in 1957, and four or five on 30-inch east to Port Arthur. The 30-inch pipe will not be rolled until the spring, as the mill which has the contract is still under construction. Total to be contracted will be about 900 miles.

Saskatchewan Continues High Discovery Rate

With seven wildcats successful out of 21 wells drilled, Imperial Oil Ltd. continued its high discovery rate in southeastern Saskatchewan in the third quarter of 1956. For first half, ratio was seven out of 13. Total success score for the three quarters was 14 out of 34, or one in 2½.

Trans-Canada Case May Go To Court

A court fight may be ahead as the Tennessee Gas Transmission Co., and its subsidiary, Midwestern Gas Co., try for permission to bring Canadian gas to the U. S. Attorneys opposing the venture, including Northern Natural Gas Co., Omaha, have given broad hints they'll go to the courts, if necessary, to try to block the project.

At the same time Tennessee and Midwestern have given signs they'll be equally quick to go to the courts, if they lose at the FPC.

The current controversy is over a motion to the FPC to dismiss the Tennessee-Midwestern application outright, without even awaiting completion of the case. Whatever the decision, a trip to the Court of Appeals, then to the U. S. Supreme Court, may be in store.

Only way to avoid a court fight, according to some observers, is for Tennessee and Midwestern to work out a deal with Northern and other companies which also want to bring in Canadian gas. There are precedents for such deals.

One FPC hearing in the case brought out one of the largest turnouts of top brass of the gas industry on any matter in a long time. Attending the session were such prominent figures as John F. Merriam, president of the Northern Natural Gas Co.; James F. Oates, Jr., chairman of Peoples Gas Light and Coke Co.; J. J. Hedrick, president of Natural Gas Pipeline Co. of America; W. E. Mueller, president of Colorado Interstate Gas Co.; N. W. Freeman, president of Midwestern Gas Transmission Co.; Ralph T. McElvenny, president of American Natural Gas Co.

The Federal Power Commission has reversed itself, and now holds it can approve a gas pipeline relying entirely upon gas imported from Canada. (See World Petroleum, November 1956, p. 8.)

The FPC decision, which was issued without dissent, was an about-face from the commission's policy of a few years ago in the case of the Pacific Northwest Pipe Line Corp. The new ruling came November 15, in a case involving Tennessee Gas Transmission Co. and its subsidiary, Midwestern Gas Transmission Co.

The commission said:

"Without undertaking to pass upon what authorizations, if any, should issue in these proceedings, we conclude that the views expressed in the Northwest opinion disapproving of reliance in this country on Canadian gas as a sole source of supply should not be permitted to stand.

"Of course, the matters which come before the commission should be decided on the basis of their particular facts.

"It is possible to envisage circumstances under which a project, relying wholly upon Canadian gas, could be found in the public interest, depending upon the particular facts in a given case.

"Accordingly, we cannot adhere to a rule which bans in advance all such projects, without reference or regard to the circumstances of particular cases which may come before us for decision."

In the case of Pacific Northwest and others, the commission ruled it contrary to the public interest to give the go-ahead to a line relying chiefly on Canadian gas.

The commission ruled against authorizing "a most important new project to serve a major area—involving a large and important segment of the American economy—which from the outset will be completely tied to and wholly dependent upon an exclusive source of supply" imported from another country, and "entirely beyond the control of agencies of the United States."

In the new ruling the commission backed up its examiner, Francis L. Hall.

Apart from laying to rest the ban on relying 100% on Canadian gas, the commission decision denied motions from several U.S. natural-gas companies to dismiss the Tennessee-Midwestern applications at once.

The motions were filed on the grounds that Tennessee-Midwestern has not proved it has a firm gas supply, firm markets, and sound financing plans. The commission action was to let the case go on to completion of hearings before a decision is made.

The Tennessee-Midwestern case is intimately linked with the project of Trans-Canada Pipe Lines Ltd. for a line across the Canadian continent to the East Coast.

A large volume of Canadian gas would be sold on the way to Tennessee-Midwestern, and this volume is relied upon to make the Canadian venture financially sound. Without it, the Canadian project may have trouble.

Opposition springs largely from several U. S. pipeline companies which also want to bring in the Canadian gas. Northern Natural Gas Co., Omaha, Neb., for instance, claims it was first with plans to bring in Canadian gas, and does not want to be cut out by Tennessee-Midwestern.

Months are ahead before any decision. The chance of carrying the whole battle to the courts, up to the U. S. Supreme Court, is foreseen. This would mean more delay.

Ansul Names Export Sales Manager

Thomas Plouff, former manager of sales analysis and control, has been promoted to export manager for Ansul Chemical of Marinette, Wis. He succeeds the late C. Bernard Beidler. David Piszczek, former assistant to Plouff, succeeds him as manager of sales analysis and control. Mr. Plouff, a graduate of the University of Notre Dame, joined Ansul in 1939. Mr. Piszczek joined Ansul's purchasing department in 1953 after graduation from the University of Wisconsin.

Baroid Appointments

Key administration appointments, in line with the growth of its technical service and research departments, have been made by Baroid division of National Lead Co., Houston. Dr. J. W. Jordan is technical director of all Baroid laboratory activities; R. E. Offeman, associate technical director; E. E. Huebotter, assistant technical director of drilling muds; Jay P. Simpson, supervisor of the drilling mud laboratories; Dr. R. E. Fariss, supervisor of the Bentone laboratories; Dr. J. L. McAtee, supervisor of the technical service laboratories.

HORTON FLOATING ROOF TANKS

Guard Volatile Hydrocarbons at a Flying Red Horse Refinery

The "Flying Red Horse," trademark of The Vacuum Oil Company, has long symbolized highest quality petroleum products. Helping safeguard product quality and reduce evaporation loss of volatile hydrocarbons at Vacuum's refinery in Corytown, Essex, England are four 55,000-bbl. Horton Double-Deck Floating Roof storage tanks.

Horton Floating Roofs—built in three types, Double-Deck, Pontoon and Pan—reduce evaporation losses, corrosion and fire hazard in tanks storing volatile hydrocarbons. Floating directly on the surface, the entire bottom of a Horton Floating Roof is normally in contact with the liquid in the tank. There is no air-vapor mixture above the liquid to be vented and lost.

Write our nearest office for further information.

Four 55,000-bbl. Horton Double-Deck Floating Roofs built by CB&I's Licensee, Whessoe Limited, Darlington, England for Vacuum Oil Company at Corytown, Essex, England.

CBI

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
New York • Philadelphia • Pittsburgh • Salt Lake City • San Francisco
Seattle • South Pasadena • Tulsa

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

REPRESENTATIVES AND LICENSEES:

Brazil • Canada • England • France • Italy • Japan • Netherlands • Scotland • Venezuela

Latin American Oil News

Argentine Reserves Exceed 629 Million Barrels

According to General Intzaurgárat, president of the State Oilfields Department (YPF), Argentina's proved oil reserves are estimated at more than 629 million bbl; producing wells number 3,300; and average output per well is 24 b/d. Low productivity, lack of transport facilities, and the long distance from oil fields to consuming centers, he says, combine to raise production costs above the level of world market quotations. Preliminary offers by foreign firms to cooperate in the oil-development program include credit terms extending over seven years.

In the first seven months of 1956 Argentina's petroleum imports increased to 4,606,587 metric tons, 13.5% over the same period of 1955. From January-April this year imported fuel and lubricants cost Argentina 948,800,000 pesos, compared with 300,100,000 in same period 1955.

Colombian Production Up

Crude oil production in Colombia in the first six months of this year was an average of 120,315 b/d, up 8% from 110,936 b/d in the first half of last year.

The major increase came from Texas Petroleum's Operations in the Guaquiqui field. There, production was 19,374 b/d in the first half of this year, up from 9,774 b/d in the first half of last year.

Pipe line runs in the first half of the year came to 129,904 b/d up from 111,781 last year. Exports were down from 24,927,181 barrels in first half of 1955 to 12,103,647 barrels in first half of 1956.

Refinery runs in the first half this year were 41,655 b/d, compared with 38,736 b/d a year earlier.

Brazilian Crude Imports 104,355 B/D

Brazil's crude-oil imports amounted to 2,532,353 metric tons (104,355 b/d) in the first half of 1956.

BRAZILIAN OIL IMPORTS
(1st HALF 1956—METRIC TONS)

Crude oil	2,532,353
LP gas	22,090
Gasoline	245,769
Aviation gasoline	134,232
Kerosine	287,304
Solvents	1,423
Diesel oil	607,777
Fuel oil	862,984
Lube oil	81,437
Other	173
Asphalt	776
Total	4,776,318

BRAZILIAN RUNS TO STILLS
(1st HALF 1956—METRIC TONS)

	Mataripe	*Bernardes*
January	28,545	291,563
February	28,483	207,633
March	30,810	314,483
April	29,311	285,578
May	28,797	219,072
June	30,008	307,900

New Brazilian Tankers

The 16,000-ton Brazilian tanker "Presidente Dutra" left Madre de Deus Island (Bahia), September 13, for Santos with first consignment of 115,000 bbl. Bahia crude for Presidente Bernardes refinery. Petrobras plans to ship 115,000 bbl. every 10 days.

Designed primarily to carry lubricants, Brazil's new 1,200-ton "Arnoldo Bastos" (third Petrobras tanker added this year) arrived at Rio from Glasgow shipyards on September 19.

Costa Rican Discovery Flows Salt Water

Union Oil Co. of California officials report that their Cocolas No. 2 well in southern Costa Rica is continuing to flow salt water. After determining that the salt water is not coming from about the oil zone they discovered, officials state that they are permitting the well to flow in an effort to possibly exhaust the salt water. On October 6th, the well was flowing 72% salt water and the balance oil. The water is flowing under severe pressure.

Bintliff Interests in Guatemala

A concession to explore and develop potential petroleum production on opproximately 100,000 acres in the Lago Izabel area of Guatemala has been granted the David C. Bintliff Interests of Houston and a Guatemala associate, Carlos Dorion. The concession was granted to Inversiones Guatemaltecas—Americanas, S.A. The territory covered in the concession lies mainly between two portions of the lake. Access by water from the Gulf of Honduras is possible, and Mr. Bintliff indicated that he anticipated use of barge-mounted drilling equipment.

Cuban Petroleum Congress

Cuba's II Petroleum Congress will be held in May of 1957, according to announcement in Havana by Prof. E. Lorenzo- Luaces V., director. A general organizing committee, presided by Dr. Alberto Diaz Masvidal, president of Petroleo Cruz Verde, S.A., has been set up to conduct the II Congress.

The Congress will be divided in six sections each under the supervision of a chairman, responsible for the program. These are: Section I—Geology, Geophysics and Geochemistry; Section II—Drilling and Production; Section III—Processing, Distribution and Utilization; Section IV—Research, Development and Twisting; Section V—Education and Training of Personnel; Section VI—Economics and Law.

Record Peruvian Production Forecast

Crude production in Peru may reach a record of 18 million barrels during 1956 (49,300 b/d) on the basis of production for the first six months of this year.

Crude production by individual companies is as follows:

PERUVIAN PRODUCTION—1ST HALF 1956)

	Crude	*Int'l Pet. Co.*	*Compania Petr.*	*Emprero Lob. Pet.*	*Ganso Fiscal*	*Azul Co.*	*Total*
January		31,138	11,047	1,846	748		44,779
February		30,609	17,177	1,739	732		50,257
March		30,498	16,988	1,869	847		50,202
April		31,008	17,360	2,183	857		51,408
May		31,175	11,846	2,223	675		45,919
June		31,095	18,353	2,192	639		52,279
NATURAL GASOLINE							
January		1,988	499	32			2,519
February		2,414	537	34			2,985
March		2,548	548	34			3,130
April		2,440	534	36			3,010
May		2,392	506	38			2,936
June		2,346	513	37			2,896

PERUVIAN RUNS TO STILLS (JUNE)
(Barrels)

International	968,720
Ganso Azul	22,248
Emprera	—
Compania Petroleum	246,728
Total	1,237.716
Prod. in June	1,655,243

Private Enterprise Favored in Argentina

A growing trend has been observed in favor of admitting private oil companies to help develop Argentina's oil reserves. It is said signs of the trend are "diverse" and apparently "spontaneous."

Rodolfo Fernando Vago, a former official of Yacimientos Petroligeros Fiscales, the government oil monopoly, had something favorable to say concerning this trend. He is head of the government-administered Petroquimica.

He called for a policy permitting speed-up work by YPF, but which also "permits private companies at the same time to develop in areas which have not been selected previously by YPF," and under specific safeguards for the government.

Mr. Vago called for an end of the reaction against the agreement with Standard Oil (Calif.) of last September. This, he said, "was one of the most important factors contributing to the movement of public opinion which culminated in the revolution." Any new agreement with private companies, he said, should be under safeguards for the government.

Jose Hipolito Lencinas, president of the Union Civico Radical Federalista, called the present policy "suicidal," as YPF has been able to meet only part of the country's growing needs for crude petroleum. The balance comes from imports. He urged the country "develop our oil industry in every way—not continue with the taboo of state monopoly," which, he called "a blind, selfish" system.

The Democratic Party, which is conservative, called in a resolution of September 27 for entry of private capital for crude oil and electric power development. Dr. Federico Pinedo, on being admitted to the Academy of Economic Sciences in October, demanded entry of private capital for oil development because YPF is unable to do the job.

El Mercurio, publication of the Chamber of Commerce of Argentina, came out for private companies to join in, and said YPF will not be able to meet crude oil needs four years off, even under its present goals.

Concession Bids in Costa Rica

The Costa Rican government will entertain bids from major oil companies for exploration and exploitation rights in two areas of the country.

One area is in the province of Heridia, northwest of the capital, San Jose, and the other is in the province of Puntarenas, bordering the Pacific coast. Union Oil of California is the only company holding exploration and exploitation rights in Costa Rica at this time, one concession being in the province of Limon bordering the Caribbean and the other in the province of Guanacaste in northwest Costa Rica bordering Nicaragua.

Officials of the Division of Industries, Ministry of Agriculture, which will handle the matter, have not disclosed on what basis bids will be considered. However, they reported that nine American oil companies have requested concessions in Costa Rica where rights have not already been granted.

The officials stated that any agreement reached with oil companies for concessions will be on the basis of a contractual arrangement with the government, which, in turn, must have the approval of the Costa Rican Legislative Assembly. Union Oil has such an agreement, whereby the government will receive approximately 50% of any profits obtained as a result of their exploration and subsequent exploitation of any petroleum deposits located.

The Legislative Assembly is drafting a petroleum law for Costa Rica. However, officials stated that the two concessions involved will be granted prior to the time an oil law can be enacted.

Refinery Operations Improve

Because of improved operating techniques, Presidente Bernardes refinery (nominal capacity 45,000 b/d) since September 22 has been processing 72,000 b/d. In October it began distributing type "B" gasoline (83-octane) to the Sao Paulo market.

Now made abroad to meet demand abroad

High standards of quality and performance have long been responsible for the frequency with which our products are specified by the petroleum industry in the United States, Canada and Latin America.

Now the same efficient gauges, safety and safety relief valves, pneumatic transmitters, and steel valves are being produced in England, France, Belgium, Western Germany and Italy by companies well-known for precision manufacture. These licensees help to assure global availability of quality products bearing our brand names, *with payment acceptable in the currencies of those countries.*

Each of our licensees is unreservedly qualified to assist you in selecting the right types of industrial instruments and valves for your particular needs. We invite you to obtain from them specific product information for both new installations and facilities now in operation. Or write our Export Division as noted below.

IN ENGLAND

Dewrance & Co. Ltd., London, S.E. 1
Ashcroft Duragauges
Ashcroft Pneumatic Transmitters
Consolidated Safety Relief Valves
Consolidated Safety Valves
Consolidated "Maxiflow" Safety Valves
Consolidated "Electromatic" Relief Valves
Hancock 800# Type 950 Steel Gate Valves

IN FRANCE

M.T.P. — SAPAG, Paris
Consolidated Safety Relief Valves
Hancock 1500# and 2500# Steel Valves
Hancock 800# Type 950 Steel Gate Valves
Hancock Steel "Flocontrol" Valves

IN BELGIUM

Ateliers Jaspar, S.A., Liege
Consolidated Safety and Safety Relief Valves

IN WESTERN GERMANY

Deutsche Babcock & Wilcox Dampfkessel-Werke, Oberhausen (Rheinl)
Consolidated Safety Relief Valves
Consolidated Safety Valves
Consolidated "Maxiflow" Safety Valves
Consolidated "Electromatic" Relief Valves

IN ITALY

Societa Carraro & Co., Milan
Consolidated Safety Relief Valves
Hancock Temperature Regulators
Filotecnica Salmoiraghi—SPA, Milan
Ashcroft Gauges

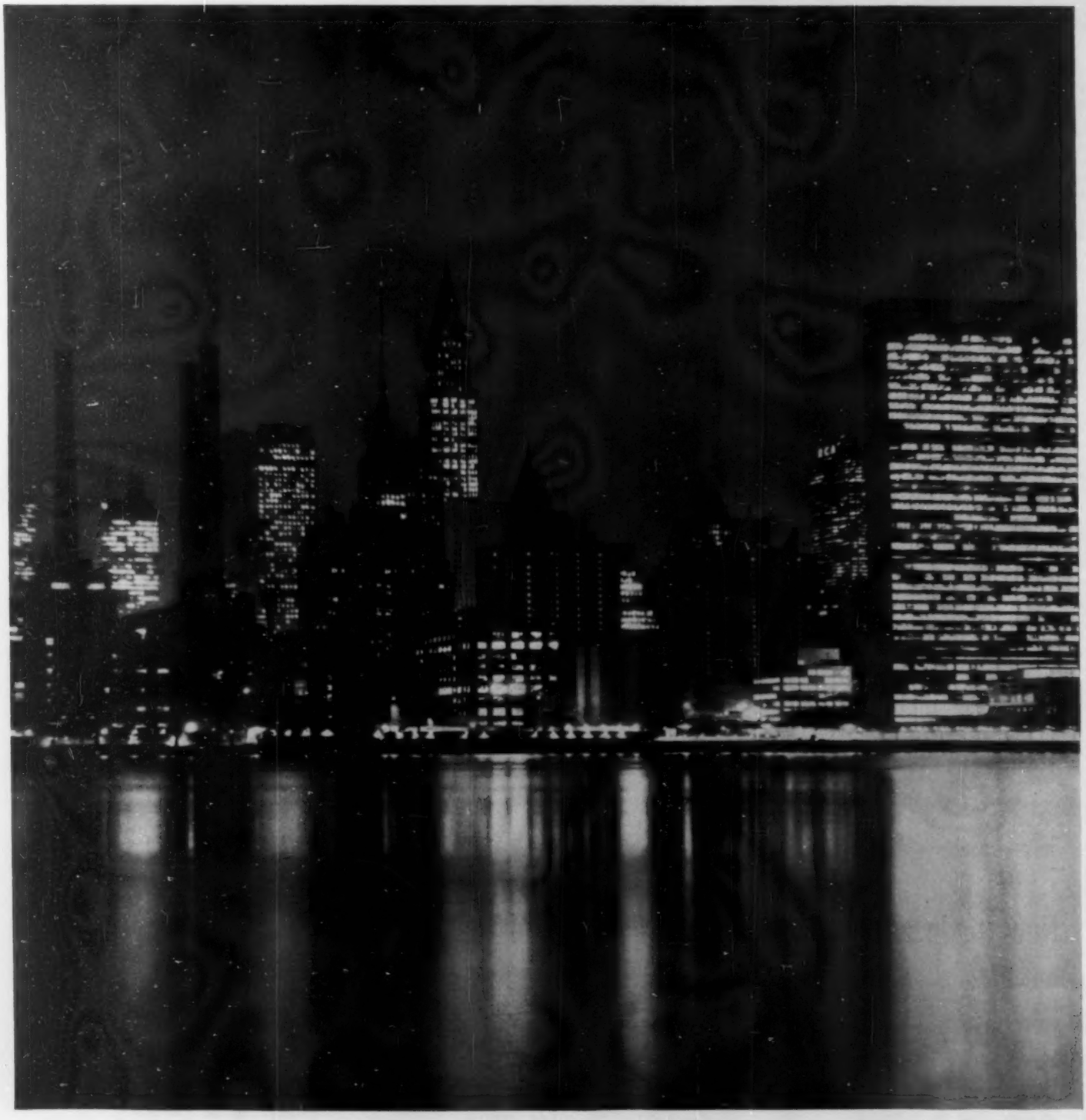
IN CANADA

Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario
Ashcroft Gauges
Consolidated Safety and Safety Relief Valves
Hancock Bronze and Steel Valves

MANNING MAXWELL & MOORE INC. TRADE MARK

MANNING, MAXWELL & MOORE, INC.

Export Division • Chrysler Building East, New York, New York, U. S. A.



"The long-range energy requirements of the United States and the world are so great that no one form of energy, as we know our energy resources today, can hope to meet more than a fraction of these requirements. There is room and need for all forms of energy, and we see nothing ahead in the oil business but a demand for more and more oil."

A statement by M. J. Rathbone, President, Standard Oil Company, (New Jersey)

Esso

STANDARD OIL COMPANY (NEW JERSEY)
AND AFFILIATED COMPANIES

putting a lid on crude oil evaporation losses

The men in the illustration are actually putting a *lid* on a tank of crude—a second, inner lid of "Microballoon"* Spheres that spectacularly cuts loss by evaporation as much as 90%. Installation of "Microballoon" Spheres by the preferred FOAM ASPIRATOR METHOD is simplicity itself. The microscopic phenolic spheres are mixed with oil in an aspirator on the input line and pumped into the tank, where they rise swiftly to the surface, forming a veritable floating lid. The 2,000 barrel annual evaporation loss of a 35 ft. (10 m.) by 115 ft. (35 m.) tank is cut to 200 barrels. Spectacular? Yes, and so is the low cost of installation that pays for itself in less than a year.

For further detailed information on how "Microballoon" Spheres put a lid on evaporation and take the lid off profits, write for FREE booklet (WP-12), "The Microballoon Layer", to:

PLASTICS DEPARTMENT
UNION CARBIDE INTERNATIONAL COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y., U. S. A.
Cable Address: **UNICARBIDE**, New York

**Trade-mark of The Standard Oil Company (Ohio), U. S. A.*

The term UNION CARBIDE is a trade-mark of Union Carbide and Carbon Corporation.

UNION CARBIDE has distributors in principal cities throughout the world.

UNION CARBIDE
TRADE-MARK
Phenolic Plastics

to an executive too mad to talk!

Maybe you've experienced too many headaches—too many delays—lost both time and money getting plans converted into plants that will provide efficient production to keep your company abreast of the demands of its markets and customers.

Procon's flexibility allows for quick, decisive action—action that can only stem from a thorough understanding of petroleum, petrochemical and chemical plant requirements. It's that kind of understanding plus fast action that has made Procon outstanding in the field of plant construction for these basic and all-important industries.

Maybe we can help you. At least, we'll try whenever you give us the opportunity.

PROCON®

PROCON *Incorporated*
1111 MT. PROSPECT ROAD, DES PLAINES, ILLINOIS, U. S. A.

PROCON (*Canada*) LIMITED
TORONTO 18, ONTARIO, CANADA

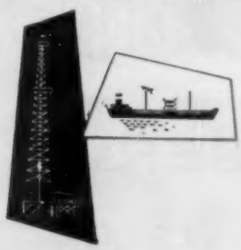
PROCON (*Great Britain*) LIMITED
LONDON, W. C. 2, ENGLAND

WORLD-WIDE CONSTRUCTION FOR THE PETROLEUM, PETROCHEMICAL, AND CHEMICAL INDUSTRIES.

COAL
PLATINUM
GOLD
TUNGSTEN
DAIRY PRODUCTS
WHEAT
MERCURY
TOBACCO
FRUIT
NEW ZEALAND
JEWEL OF THE SOUTHERN SEAS
NEW ZEALAND
. . . land of friendly, freedom-loving people . . . home of the stalwart Maori . . . island country of more than a hundred thousand square miles, where nature has bestowed grandeur and wonders in abundance . . . it is aptly called "Jewel of the Southern Seas."

NEW ZEALAND . . . Its rich soil, moderate climate and man's diligent labor have combined to produce bountiful crops, sturdy sheep and cattle, and have made this country one of the world's largest exporters of wool, mutton, beef and dairy products. Mineral deposits and timberlands add to the country's natural wealth; its growing enterprises include textiles and clothing, electrical equipment and household appliances, footwear, food canning, motor car assembling, furniture, plastics. As these and other industries expand, the self-reliant people of New Zealand move ever forward toward a better standard of living for all.

Standard-Vacuum is proud of the part its affiliates play in supplying the petroleum products so essential to the welfare and continued growth of New Zealand.



STANDARD-VACUUM OIL COMPANY

A name that stands for "Progress" in the East

26 BROADWAY, NEW YORK 4, N. Y.

AUSTRALIA • BURMA • CEYLON • HONG KONG • INDIA • INDO-CHINA • INDONESIA • JAPAN • KENYA • MADAGASCAR
MALAYA • NEW ZEALAND • PAKISTAN • PHILIPPINES • PORTUGUESE EAST AFRICA • RHODESIA • SINGAPORE
SOUTH PACIFIC ISLANDS • SOUTH WEST AFRICA • TANGANYIKA • THAILAND • UNION OF SOUTH AFRICA

1956

—year of the great Oil Lift!

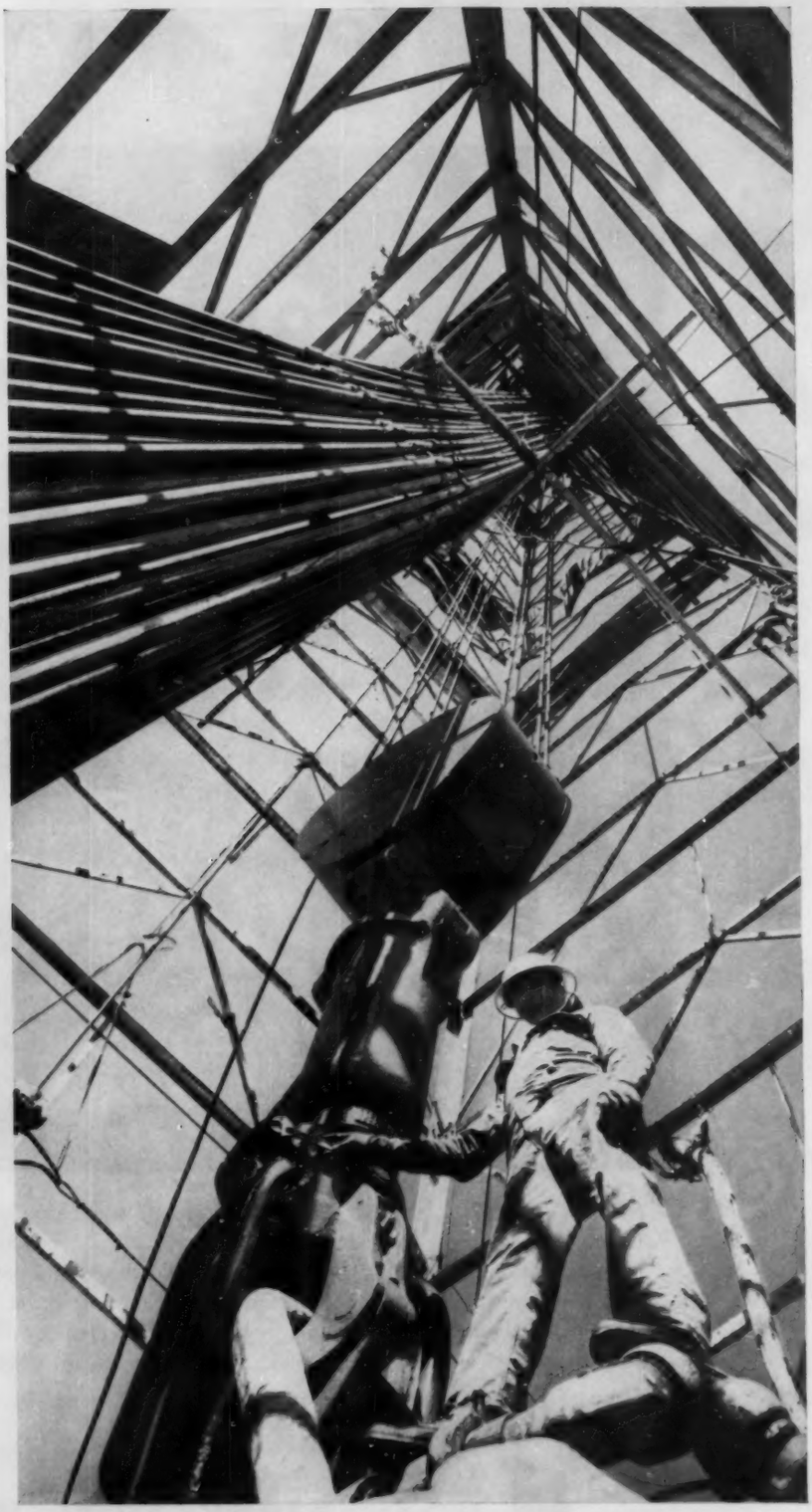
The chips are down, the job is clear.

From the depths of the earth, oil men must lift more petroleum than ever before in history to meet the world's unprecedented and ever-growing demand.

So great, in fact, has the demand become, that Cities Service has set the objective of finding and producing more oil in the next few years than during its entire history of nearly a half century!

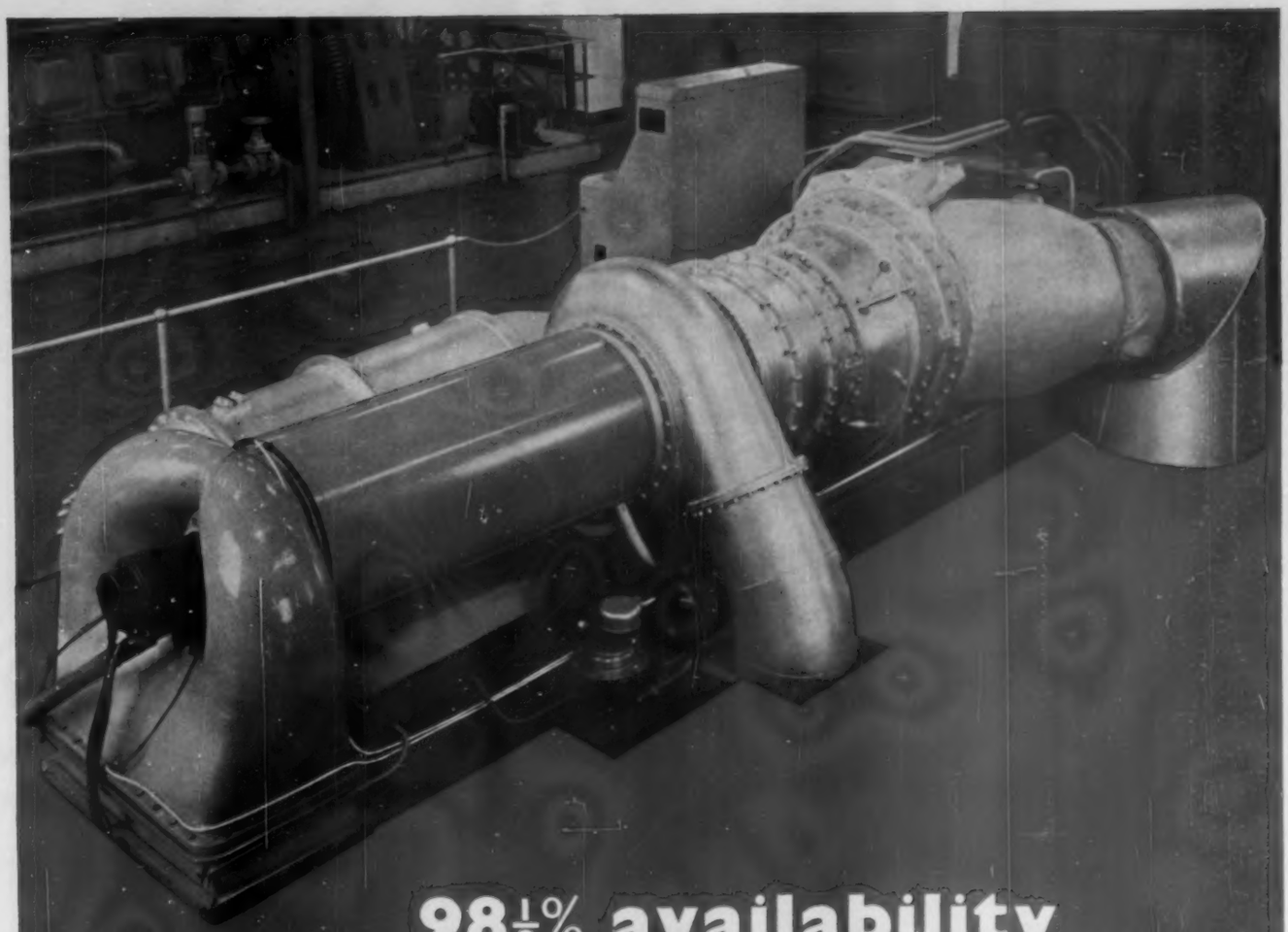
Meanwhile, virtually the entire scope of Cities Service activity also continues to expand to meet soaring demand. New oil reserves and refining facilities, new pipelines and tankers, and new stations and dealers are constantly being added to keep pace with mounting sales.

But the true significance of this growth is not measured by rising sales curves or production reports. Rather it is seen in the atmosphere which fosters them . . . an atmosphere in which a major corporation recognizes its responsibilities to the nation and rejoices in the freedom to uphold them.



CITIES SERVICE

Progress through Service



98½% availability

This Ruston 'TA' Gas Turbine went into regular service on the 28th July 1955 at the Refinery of Azienda Generale Italiana Petroli in Northern Italy. Allowing for periods of normal refinery maintenance, the total possible running time up to the 30th September, 1956 was 9624 hours out of which the **gas turbine ran for 9489 hours** . . . *a case history underlining the outstanding 'continuous-service' potential of*

Incidentally, the ... turbine was installed and running within ... days from arrival at site.

RUSTON GAS TURBINES

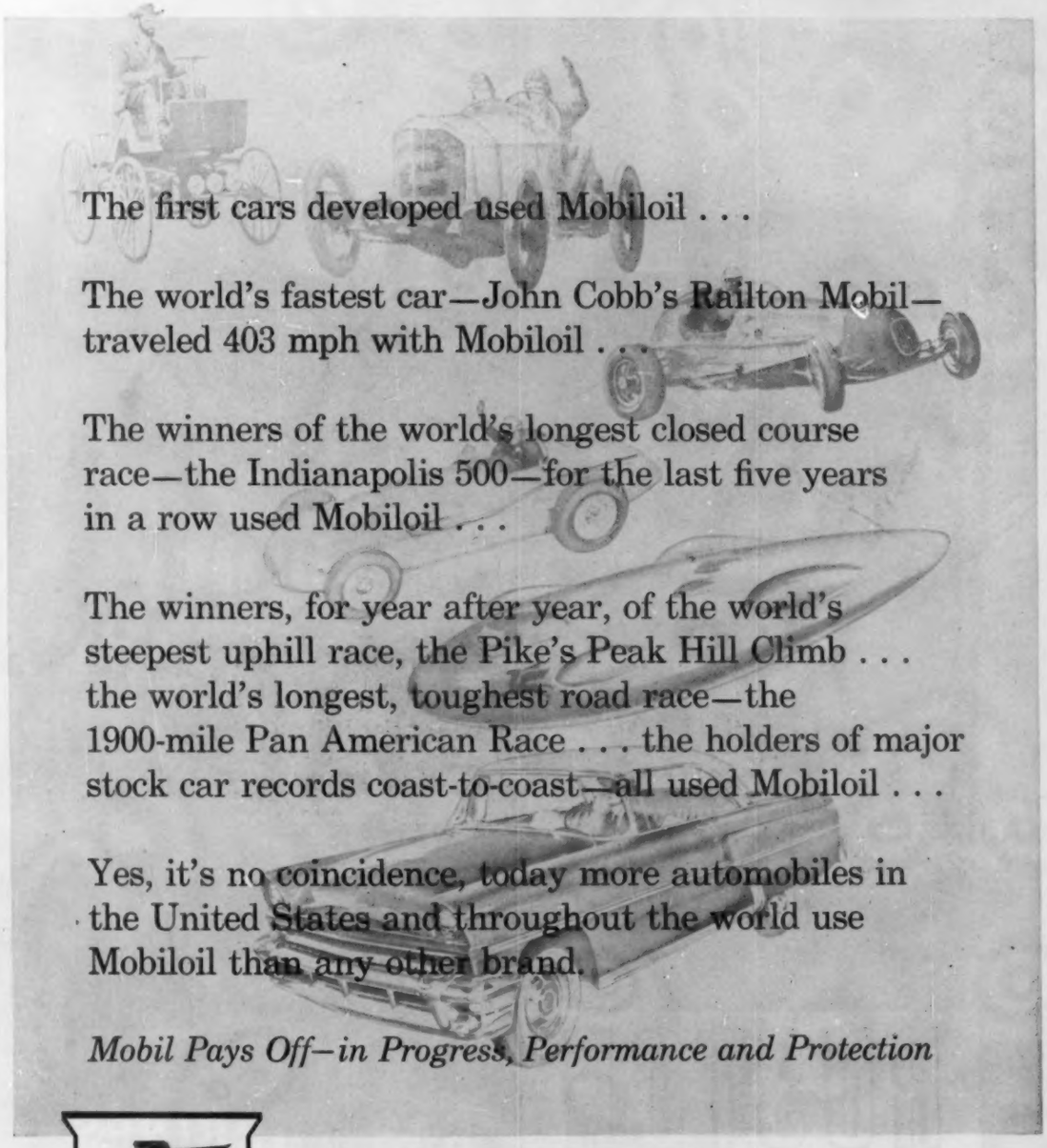
FOR DEPENDABILITY AND LOW MAINTENANCE

RUSTON & HORNSBY LTD · LINCOLN · ENGLAND

ASSOCIATED WITH DAVEY, PAXMAN & CO. LTD., COLCHESTER

Built under licence, for sale in the U.S.A., by Clark Bros., Co., Olean, N.Y., U.S.A.

It's no Coincidence...



The first cars developed used Mobiloil . . .

The world's fastest car—John Cobb's Railton Mobil—traveled 403 mph with Mobiloil . . .

The winners of the world's longest closed course race—the Indianapolis 500—for the last five years in a row used Mobiloil . . .

The winners, for year after year, of the world's steepest uphill race, the Pike's Peak Hill Climb . . . the world's longest, toughest road race—the 1900-mile Pan American Race . . . the holders of major stock car records coast-to-coast—all used Mobiloil . . .

Yes, it's no coincidence, today more automobiles in the United States and throughout the world use Mobiloil than any other brand.

Mobil Pays Off—in Progress, Performance and Protection

SOCONY MOBIL OIL COMPANY, INC.

and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

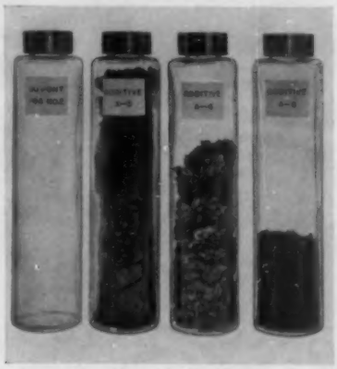
PETROLEUM CHEMICALS DIVISION
NEWS

December ★ One of a Series of Bulletins for the Petroleum Industry ★ 1956

You can SEE the advantage of using ASHLESS Du Pont FOA-2

When you burn 1,000 gallons of home heating oil containing a dispersant additive, how much ash does the additive leave?

That depends on the additive—as the picture below clearly shows.



These bottles (8 fluid-ounce size) contain the amount of ash left from burning four different heating oil additives.

The bottle on the left contains practically *no* ash, although enough *nonmetallic* Du Pont Fuel Oil Additive No. 2 (FOA-2) was burned to protect 1,000 gallons of fuel oil. (Actual concentration: 20 lbs./1,000 bbls.) The other bottles contain the ash left after burning cost-equivalent amounts of three metallic additives. The difference is so striking that comment seems superfluous.

Stack control failures

What damage do these ash deposits do in the burner system?

Many stack control failures can be attributed to metallic ash deposits on the helical coil. And such failures are likely to prove hazardous and result in needless, unprofitable service calls.

In rotary burners, metallic additives leave deposits on the flame rim and electrode. These tend to short out the electrode, causing ignition difficulties. And even if ignition is accomplished, the deposits on the rim will interfere with the progress of the flame around it.

In diesel fuels

When metallic additives are used to stabilize economy grade diesel fuels, there is a danger that these additives will contribute a sparking tendency to the fuel.

* * *

For more information about FOA-2, just address your request to our nearest sales office.

New dry-dye drumhead makes eduction faster and cleaner

Du Pont petroleum dyes are now being shipped in drums covered with newly designed steel drumheads, each having a 2-inch circular opening. Through this the dry-dye eduction probe can be easily inserted and manipulated.

NOTE HOW easily the dry-dye eduction probe can be inserted through the opening of this new-type Du Pont dye drumhead.

This opening is sealed with a plastic disc. When the dye is to be removed, the disc can be easily cut out with a penknife. (See cut on next page.)

The opening is rimmed with plastic which is threaded to accommodate a standard 2-inch pipe plug. That means easy re-sealing . . . to protect the quality which is built into all Du Pont dyes.

The new drumhead need not be removed. Using the small opening instead reduces dusting to an absolute minimum. When the eduction probe is inserted, little open space is left around it. Hence little, if any, dry dye will

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

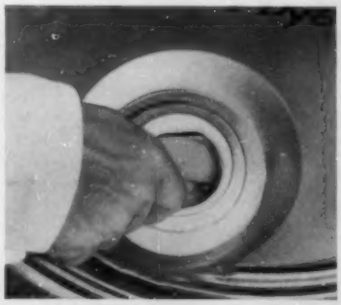
PETROLEUM CHEMICALS DIVISION NEWS

CONTINUED *New dye drum*

emerge, except as desired—through the probe itself.

Second recent improvement

The new drumhead follows by only six months another radical improvement in dry-dye eduction procedure—the new probe that is virtually clog-proof. More than 100 are now in service, and the demand for them continues.



FOR SHIPPING, the small opening is sealed with a plastic disc which can be easily cut out with a pocket knife.

Any of our sales offices listed below will be glad to give you complete information on the new dye drums and eduction probe. If you are not now using the dry-dye eduction system, our Operations Group will be glad to help you set up the complete installation.

A STANDARD 2-inch pipe plug keeps the dye drum tightly closed once the seal has been broken.

ASSISTANT MANAGER OF OPERATIONS

RUSSELL B. DAVIS has been attached to the Operations Group of the Du Pont Petroleum Chemicals Division since 1947. He currently supervises the work of this group, whose chief concern is to help refiners maintain safe, efficient handling of tetraethyl lead and other additives.

His contributions to safer TEL handling and more efficient plant operations in connection with the use of additives have been many. He played an important part in the development of such Du Pont-designed equipment as the metal-flex unloading hose, the siphon starter and the new, non-clogging dry-dye eduction probe.

After joining the Du Pont Company in 1933, his first assignment was in the Rayon Department. He was later transferred to the Engineering Department. From 1936 to 1947, he held a number of manufacturing positions in the Organic Chemicals Department, mostly connected with TEL manufacture.

Mr. Davis received his Mechanical Engineering degree from Rensselaer Polytechnic Institute. He is a member of the American Petroleum Institute, the National Safety Council and Sigma Xi Fraternity.

NEW DYE BOOK AVAILABLE

Gives detailed information on coloring all types of petroleum products

With the public becoming more and more color-conscious every day, refiners and marketers are putting increased emphasis on coloring all types of petroleum products.

Gasolines have been dyed for many years to indicate TEL content—also for brand identification. However, only recently have brilliantly hued greases, lubricating and home heating oils, kerosines and diesel fuels begun to appear. The merchandising advantages of using eye-appealing color for brand identification are no doubt an important reason for this trend.

To help refiners use petroleum dyes as effectively and economically as possible, we have just published a new manual on coloring petroleum products. All the latest methods of addition—including dry-dye eduction—are covered in this 20-page book.

It also contains data on meeting color requirements for military, aviation and leaded motor fuels. And full information on Du Pont Petroleum Dyes—with solubility charts and spectrophotometer curves—is included.

Just address your request for this book to one of our Petroleum Chemicals Division sales offices. Ask for a copy of "Du Pont Petroleum Dyes."

DU PONT
REG. U.S. PAT. OFF.
Better Things for Better Living . . . through Chemistry

Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.) *Petroleum Chemicals Division* • *Wilmington 98, Delaware*

Sales Offices:

CHICAGO 3 — 8 So. Michigan Ave.	RAndolph 6-8630	PHILADELPHIA 2 — 3 Penn Center Plaza	LOcust 8-3531
CLEVELAND 15 — 25 Prospect Ave.	SUperior 1-1363	PITTSBURGH 22 — Room 731, 1 Gateway Center	ATlantic 1-2933
HOUSTON 2 — 705 Bank of Commerce Bldg.	CApitol 5-1151	SAN FRANCISCO 4 — Room 626, 111 Sutter St.	EXbrook 2-6230
LOS ANGELES 17 — 612 So. Flower St.	MAdison 5-1691	SEATTLE 3 — Room 215, 4003 Aurora Ave.	MElrose 6977
NEW YORK 20 — 1270 Ave. of the Americas	COlumbus 5-2342	TULSA 1 — P. O. Box 730, 1811 So. Baltimore Ave.	LUther 5-5578

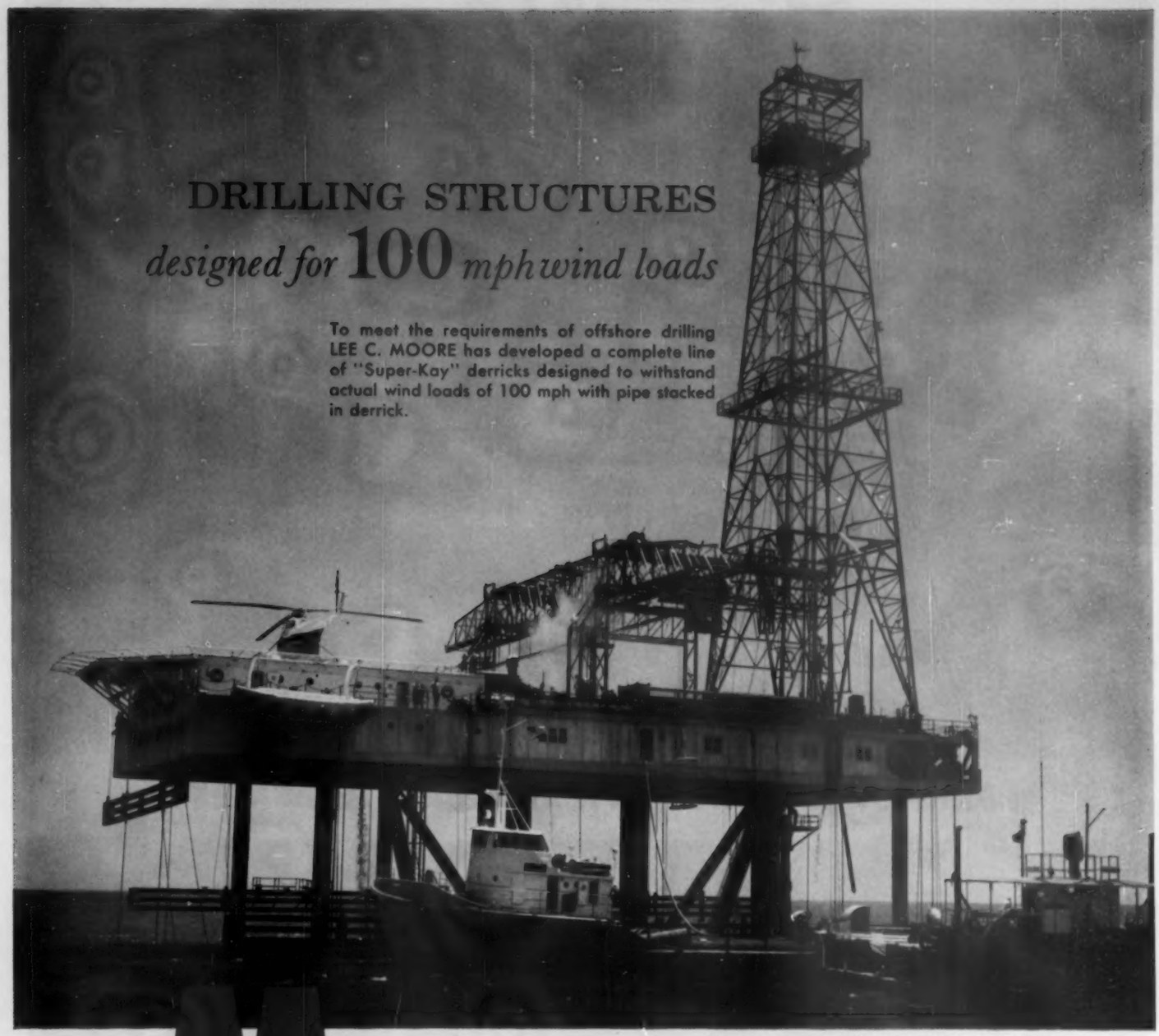
IN CANADA: Du Pont Company of Canada Limited—Petroleum Chemicals—85 Eglinton Avenue East—Toronto 12, Ontario—HUdson 1-6461

OTHER COUNTRIES: Petroleum Chemicals Division—Export Sales—Room 7496, Nemours Bldg.—Wilmington 98, Del.—OLympia 4-5121, Ext. 2962

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

A-3207

Printed in U. S. A.



DRILLING STRUCTURES
designed for 100 *mph wind loads*

To meet the requirements of offshore drilling LEE C. MOORE has developed a complete line of "Super-Kay" derricks designed to withstand actual wind loads of 100 mph with pipe stacked in derrick.

Four wells are drilled from this 140′ LEE C. MOORE SUPER-KAY derrick by shifting the crown, rotary and racking platform.

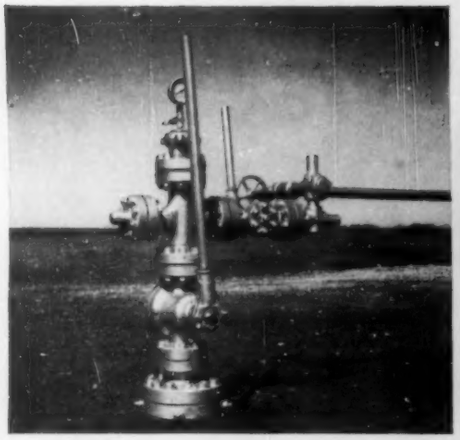
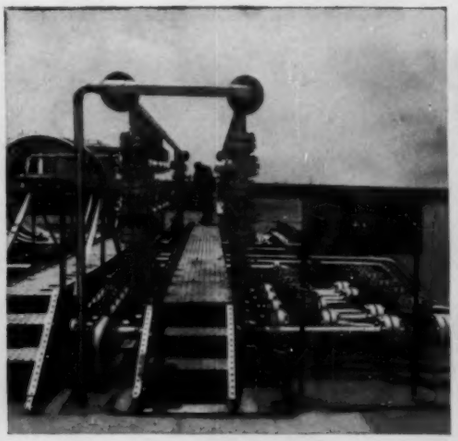
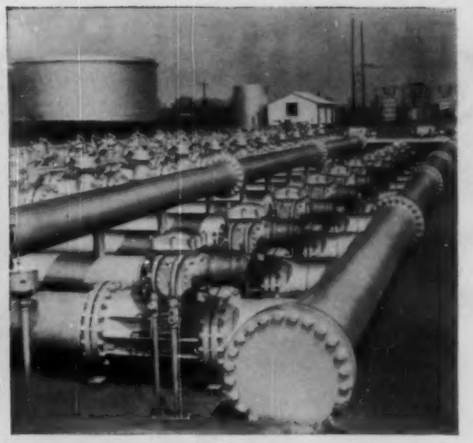
LEE C.

Moore CORPORATION

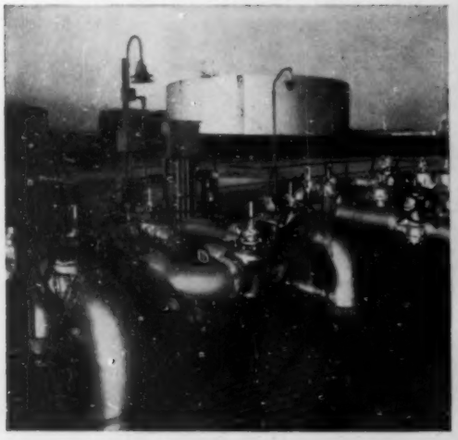
TULSA: SHREVEPORT: GREAT BEND: CASPER: NEW ORLEANS: CENTRALIA: DALLAS: HOUSTON: MIDLAND: PITTSBURGH

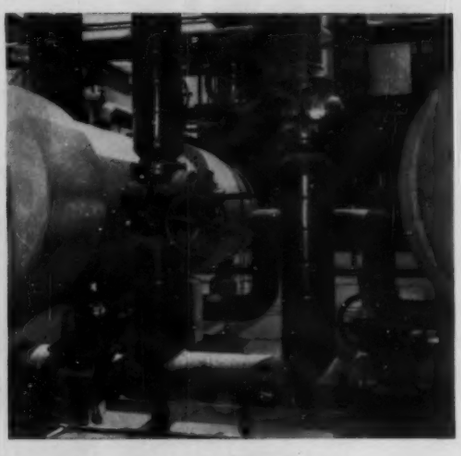
EXPORT OFFICE: Room 624, International Bldg., 630 5th Ave., New York 20, New York

FOREIGN LICENSED MFR.; Oil Well Engineering Co., Ltd., Cheadle Heath, Stockport, England

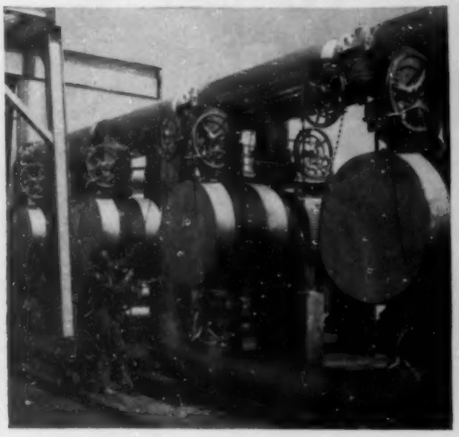
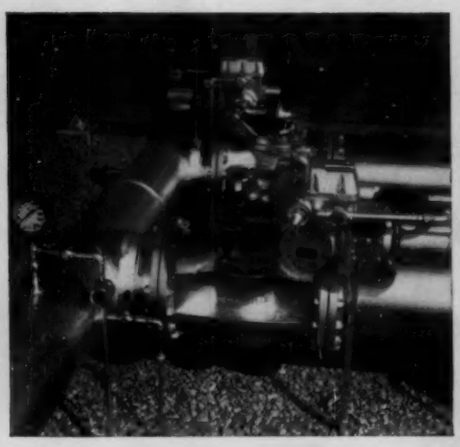
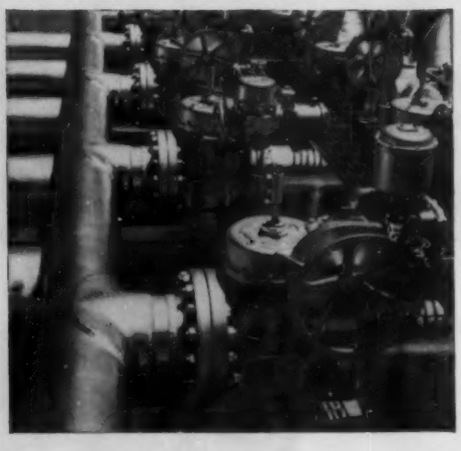




USE NORDSTROM and AUDCO LUBRICATED PLUG VALVES





FOR TIGHTER SHUT-OFF AND GREATER SAFETY

AT LOWEST COST PER YEAR.....

Rockwell MANUFACTURING COMPANY

International Department

400 NORTH LEXINGTON AVENUE • PITTSBURGH 8, PA., U.S.A.

British Valve Licensee
AUDLEY ENGINEERING CO., LTD.
Newport, Shropshire—*England*

Canadian Valve Licensee
PEACOCK BROTHERS, LTD.
Montreal, Quebec—*Canada*

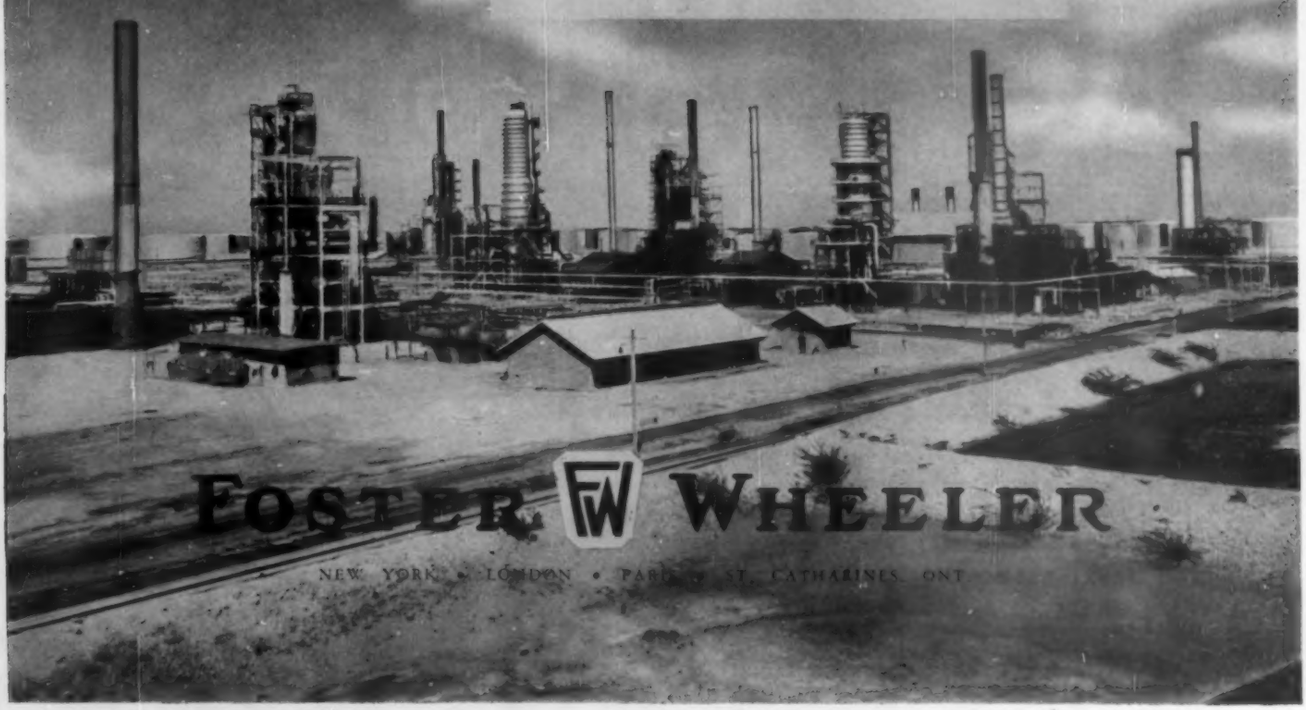
300,000 b/d

. . . this will be Creole Petroleum Corporation's crude distillation capacity when the ***FOURTH FOSTER WHEELER UNIT*** *goes on stream at Amuay Bay*

THE THREE Foster Wheeler Crude Distillation units below, on stream at Creole's Amuay Bay refinery in Venezuela, are now scheduled to be joined by a *fourth unit* which will increase the crude charging capacity to approximately 300,000 bbl/day. The new FW 75,000 bbl/day single-stage Crude Distillation unit can be operated as a crude topping unit at a capacity of 110,000 bbl/day.

Also included in this latest expansion program will be a Lube Hydrofining unit; a Hydrofiner for the desulfurization and general quality improvement of Diesel oil; a Phenol Extraction unit; a Propane Dewaxing unit and complete blending, canning and packaging facilities. All process units will be designed and constructed by Foster Wheeler.

For further information, write to *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*



FOSTER FW WHEELER

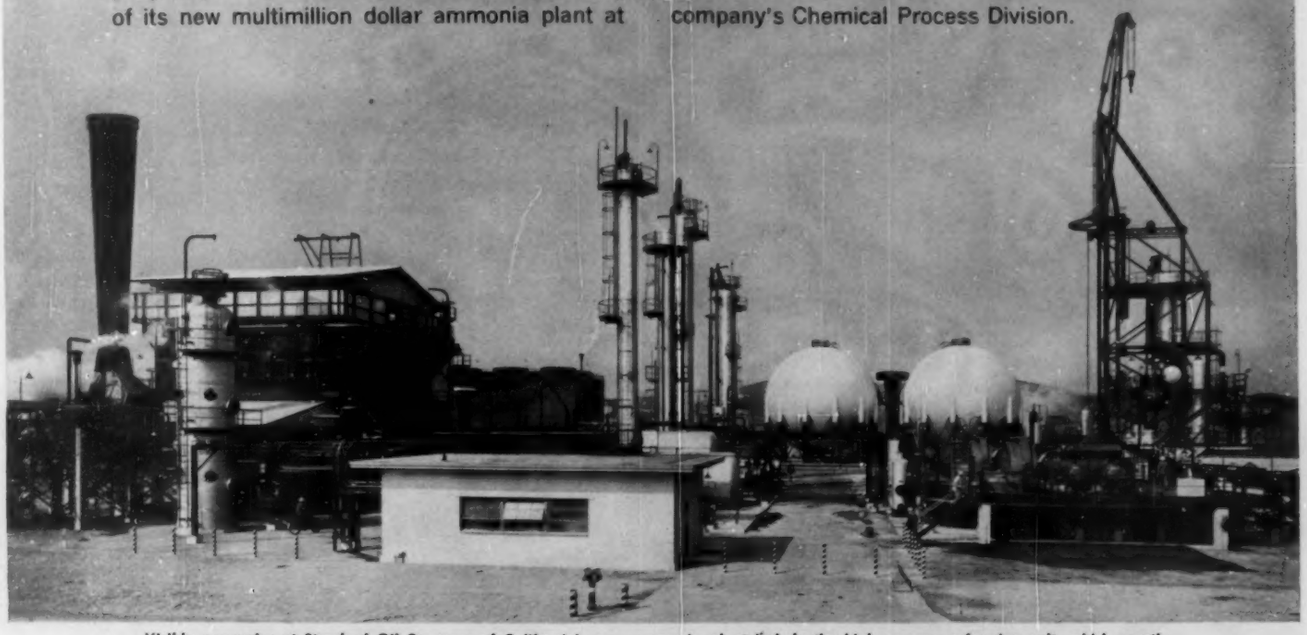
NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.

The Safe Path Between Planning and Production

The most hazardous part of the path to profits on a major investment in petrochemicals is before the plant goes on stream. Prolonged evaluation of processes and other delays in getting into production can add up to millions . . . in engineering man-hours, tied-up capital, increased labor and materials costs, procurement problems, the loss of production—and even a market itself.

Standard Oil Company of California, fully aware of these hazards, invited The M. W. Kellogg Company to participate closely in the initial planning of its new multimillion dollar ammonia plant at Richmond, California. By assigning the subsequent process design, plant engineering, and construction responsibility to Kellogg, Standard chose a path to completion that proved not only safe but fast. From the earliest discussions to the recent on-stream date, this 300 ton/day plant was producing as guaranteed in 14 months.

Further evidence of the M. W. Kellogg safe-and-sure approach to the manufacture of ammonia, butadiene, ethylene, phenol, and other petrochemicals may be obtained by contacting the company's Chemical Process Division.



Visible economies at Standard Oil Company of California's new ammonia plant include the high pressure reforming unit, which greatly reduces compressor costs; skeleton-type, economical outdoor construction; and permanent, labor-saving derrick for handling catalyst.

CHEMICAL PROCESS DIVISION

THE M. W. KELLOGG COMPANY

711 THIRD AVENUE, NEW YORK 17, N. Y.

A SUBSIDIARY OF PULLMAN INCORPORATED

The Canadian Kellogg Company Limited, Toronto • Kellogg International Corporation, London
Companhia Kellogg Brasileira, Rio de Janeiro • Compania Kellogg de Venezuela, Caracas
Kellogg Pan American Corporation, New York • Societe Kellogg, Paris

M KELLOGG W

IT'S BRAND NEW!

The O-C-T UNIVERSAL TUBING HEAD

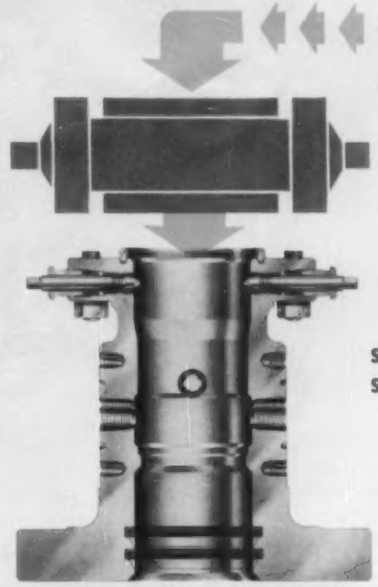
. . with 6 interchangeable dual string and single string tubing hangers!

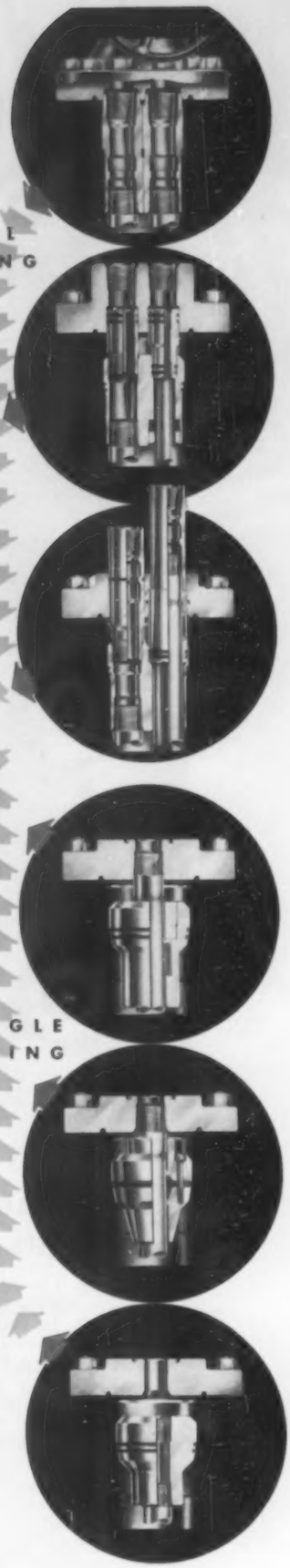
The new OCT universal tubing head is available with a complete range of interchangeable tubing hangers for both dual and single strings. Last minute changes in completions can be made without changing tubing heads or using special attachments. If only one producing sand is found in a proposed dual well, the well may be completed by using a single string hanger. If a second sand is found in a well originally scheduled for single completion, the well may be completed with a dual hanger instead of the single hanger originally contemplated.

The OCT universal tubing head is equipped with two retractable aligning screws which are used to align the dual hanger with respect to the head itself. These aligning screws are retracted when single string hangers are used.

Safety is assured, since all hangers are run through, landed and locked in place prior to the removal of blowout preventers. Once the head has been installed, all seals can be field tested through test ports located in the flanges.

This universal head is available in 600 through 2900 series and flange sizes from 6" to 10". If an operator does not desire to remove the existing tubing head in order to dually complete a well, an adapter is available.





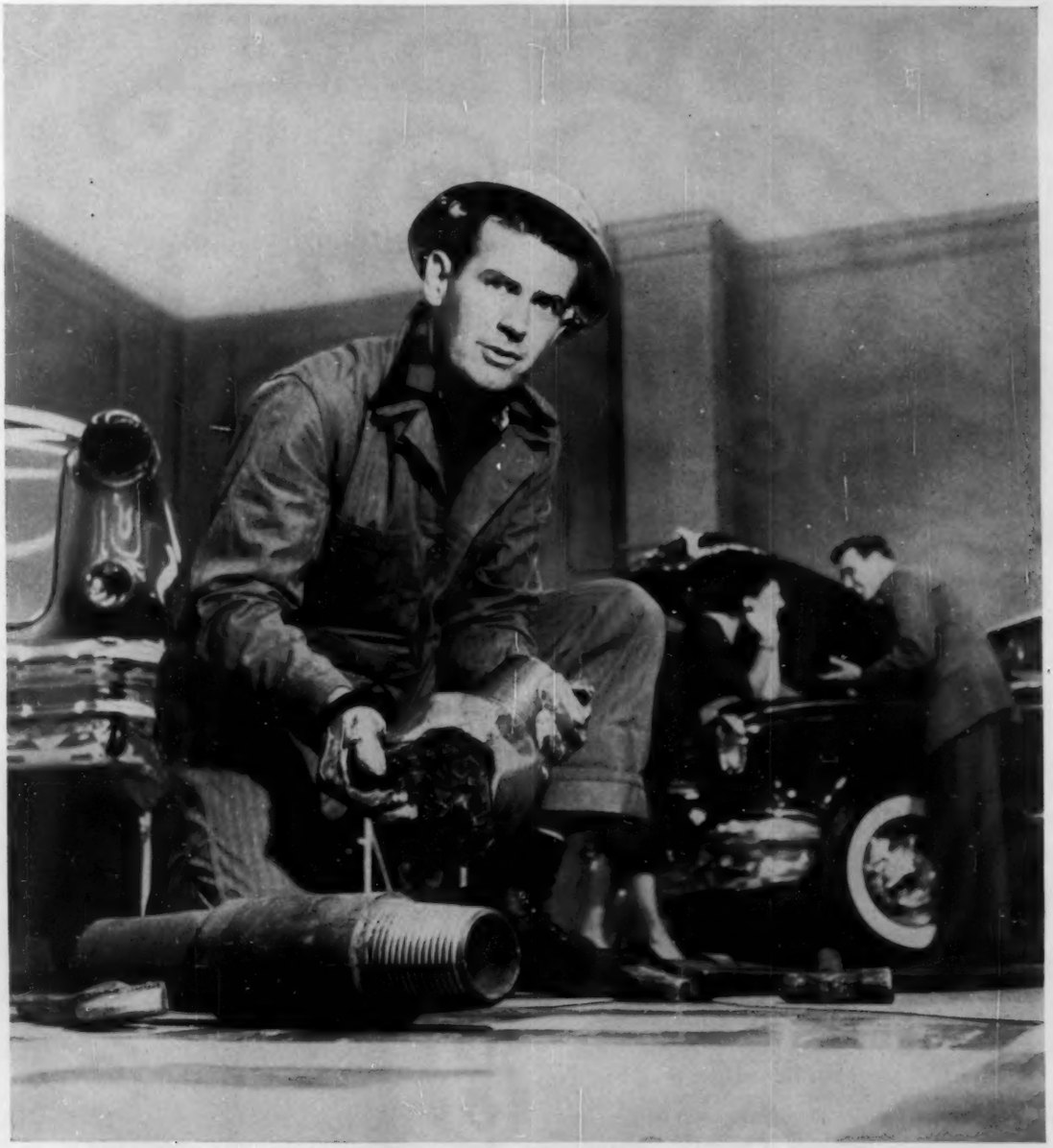
Any of six interchangeable hangers may be landed and locked in place through blowout preventers

All seals may be tested by a single application of pressure through a test port in the top adapter flange

O·C·T

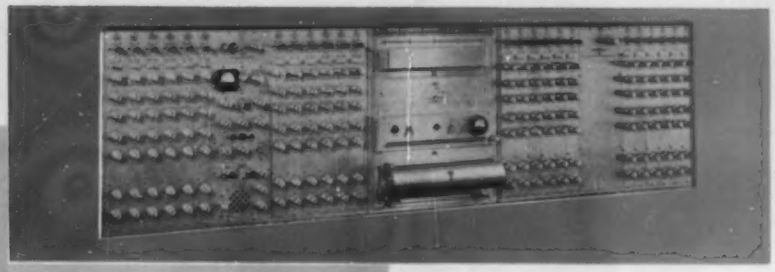
OIL CENTER TOOL CO.

Export Representatives: South America — East West Oiltools, C. A., Del Lago Hotel, Maracaibo, Venezuela. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.



All oilmen make this big sale possible! Americans bought 7,169,908 new cars last year, filled 'em up with gasoline and oil and set out for fun or business. The ready availability of gas and oil helps close every car sale, keeps the auto industry moving. In fact, we oilmen—from drillers to pipeline men—help keep millions working at everything from agriculture to zoology. When you hear someone who doesn't know the facts criticize our industry, speak up. Tell how oil helps keep our strong economy rolling in high gear. Be proud you're an oilman. And tell the world! **SHELL OIL COMPANY**

SIE G-22A SEISMOGRAPH SYSTEM



for high-production Operations

FREQUENCY RESPONSE: Within 3 db from 10 to 500 cps. Filtering as specified.

LOW DISTORTION: Less than 1% from 10 to 500 cps at 0.1 volt input.

AGC CONTROL RANGE: 0.5 microvolt to 0.1 volt input. (Three time-constants selected from front panel.)

GAIN CONTROL CIRCUITS: AGC, Expander, or simultaneous AGC-Expander operation.

RECORD PRESENTATION: Single record. Dual output. Dual record.

- First-Arrivals Unfiltered.
- Individual Channel Paralleling and Testing Switches.
- Simplified Controls.

Features essential to high-speed operation — available only on special order in many systems — are standard equipment in the G-22A.

New circuitry provides unmatched performance with all recording methods while simplifying matching and operating procedures.

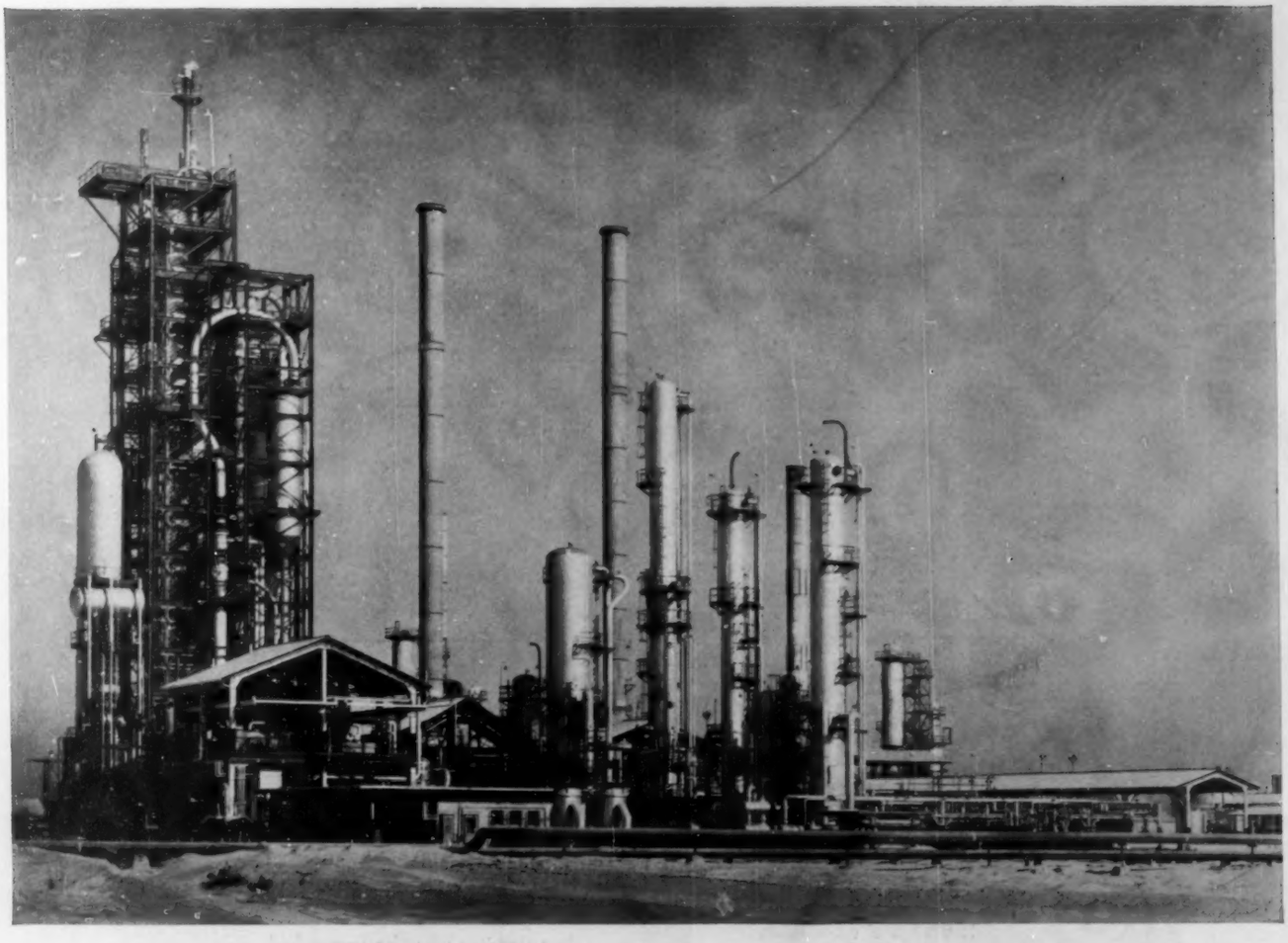
AGC Time-Constants, mixing method and percentage, and type of record presentation can be selected from the front panel. Two attenuation rates on both high and low cut filters provide hundreds of filtering combinations.

From the new self-biased AGC circuit to the simplified control panel, the G-22A's "field engineered" design combines practical operation with high flexibility.

227-56

SOUTHWESTERN INDUSTRIAL ELECTRONICS CO.

2831 Post Oak Rd.
P.O. Box 13058
Houston 19, Texas



Lummus, Aramco teamwork supplies more quality gasoline from Saudi Arabia

In August at Ras Tanura, Saudi Arabia, a 12,500 B/D Fluid Hydroformer is undergoing its first turnaround since it came on stream in October, 1955. For the past 10 months this unit has supplied 92.5 F-1 clear octane blending stock to European and Middle East markets, where the need for quality gasoline is growing rapidly.

The Hydroformer was designed and engineered by Lummus for The Arabian American Oil Company under license from Esso Research and Engineering Co. The process, though more complex than any other in the Ras Tanura Refinery, was designed for ease of operation to fit in with the Company's policy of training and upgrading Saudi Arab nationals to the fullest extent.

Close liaison among the three groups during all phases of design and construction has paid off. Startup was smooth, with all facilities operating at full design rate soon after feed was introduced. And the plant has been operating successfully ever since, at and above the design rate. In all cases, hydroformates of premium quality have been obtained from the high paraffin – low naphthene stocks characteristic of Arabian crudes.

Test runs at feed rates of 12,500 – 16,300 B/D have yielded products of 94.8 – 87.4 F-1 clear octane. There has been no difficulty in making the 92.5 octane design product at rates up to about 13,500 B/D. These tests indicate that hydroformates close to 95 F-1 clear can be produced in good yields, and should higher quality be needed, more severe hydroforming conditions appear to be feasible.

Aramco's new Hydroformer is one of over 700 major Lummus installations throughout the world. The excellent operating record of this new unit, and of Lummus plants in general, proves the case for coordinated direction of a project from idea to startup. Lummus teamwork can pay off on your next project.

THE LUMMUS COMPANY, 385 Madison Avenue, New York 17, N. Y. *Engineering and Sales Offices:* New York, Houston, Montreal, London, Paris, The Hague, Bombay. *Sales Offices:* Chicago, Caracas. *Heat Exchanger Plant:* Honesdale, Pa. *Fabricated Piping Plant:* East Chicago, Indiana. *Engineering Development Center:* Newark, New Jersey.

LUMMUS

ENGINEERS AND CONSTRUCTORS FOR INDUSTRY

VOL. 27, NO. 13 DECEMBER, 1956

World Petroleum

THE MANAGEMENT PUBLICATION OF THE INTERNATIONAL PETROLEUM INDUSTRY

FOUNDED BY RUSSELL PALMER

MONA PALMER, Publisher
E. W. MAYO, Editor Emeritus
J. C. CHATFIELD, Editor
G. H. BARROWS, Managing Editor
ELOISE MICHEL, Associate Editor
E. W. MAYO, JR., Sales Manager
A. V. HARCOURT, Production Manager
ITALO VALENTINO, Art Director

Member of National Business Publications, Inc., and Business Publications Audit of Circulation, Inc.

SUBSCRIPTIONS

1 year, $10.00
2 years, $18.00
3 years, $25.00
Single copies $1.00

GENERAL OFFICES

604 Fifth Avenue, New York 20
(Tel. JUdson 6-4820)

BRANCH OFFICES

EUROPEAN OFFICE LONDON, ENGLAND

G. L. Fetherstonhaugh, St. Paul's Corner, Ludgate Hill, London, E.C.4.
(Tel. CITY 5318)

TORONTO 1, ONT., CANADA

Allin Associates
12 Richmond St. East
(Tel. EMpire 4-2001)

WASHINGTON, D.C.

J. B. Huttlinger
National Press Building
14th and F Streets
(Tel. EX3-3733)

LOS ANGELES 14

T. T. Drake
412 West Sixth St.
(Tel. MUtual 1391)

NEW YORK 20

Sales Representatives:
E. L. Townsend
R. E. Slimermeyer
604 Fifth Avenue
(Tel. JUdson 6-4820)

TULSA 3

O. F. Cozier, Mid-Continent Advertising Manager, 305 Daniel Bldg.
(Tel. Diamond 3-1335)

World Petroleum is published by Mona Palmer, Trustee under the will of Russell Palmer

CONTENTS

4 Washington Pipe Line, *by Joseph B. Huttlinger*

6 Canadian Notes

8 Latin American News

29 Editorial—Broken Contracts Do Not Pay

30 New Era Seen in Colombian Oil Development, *by E. Ospina Racines*

33 Venezuelan Oil Boom

34 Unique Kerr-McGee Design for Offshore Drilling, *by J. W. Calvert*

36 Oil Development and Prospects on the Pacific Coast of South America, *by Juan E. Rassmauss*

38 Oil Growth in Argentina, *by B. Rickles*

42 Acetic Acid and Anhydrides Part II, *by Peter W. Sherwood*

47 Mexican Gas Imports Approved

48 Cuban Hopes are High in 1957, *by Ruth Sheldon Knowles*

52 Petrobras Expands in 1956, *by R. G. Walker*

54 New Laws Encourage Colombian Oil Search, *by B. J. Caycedo*

60 Stanvac Has New Home

62 International News and Notes

68 London Letter, *by E. Lawson Lomax*

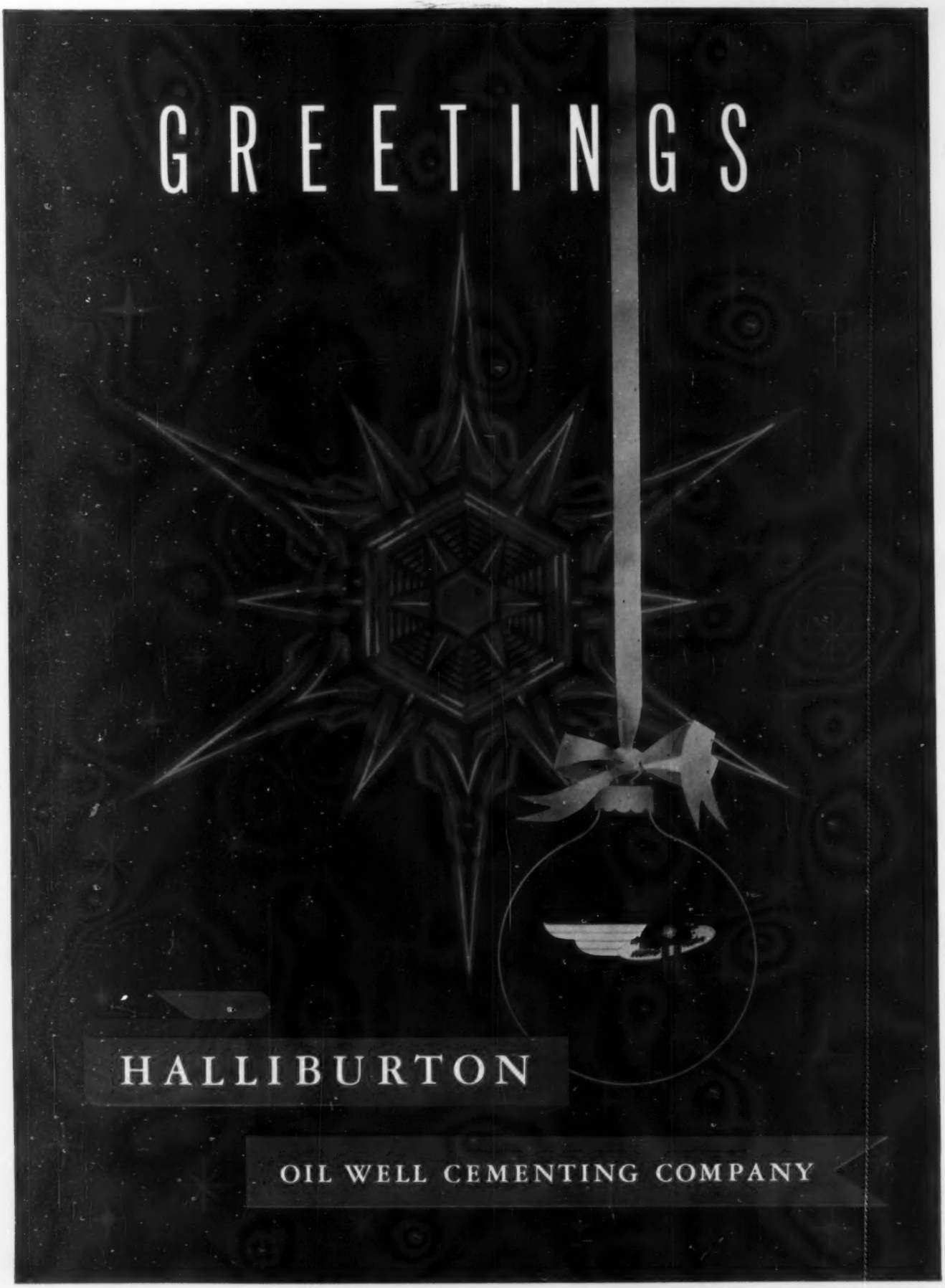
72 Oil Company Staff Changes

78 Shorts

92 Advertisers' Index

THIS MONTH'S COVER

Tankers operating in the Great Lakes late in the season sometimes arrive in port with an excess cargo—of ice. This photograph of the Traverse City Socony was snapped by Henry F. Larson, Milwaukee Journal staff photographer. Color plates are reproduced through the courtesy of Willard A. Colton, managing editor of The Flying Red Horse, house magazine of Socony Mobil Oil Co. Inc.


GREETINGS
HALLIBURTON
OIL WELL CEMENTING COMPANY

Broken Contracts Do Not Pay

EVENTS of the past few weeks have brought Europe face to face with a major problem—how to replace two million barrels of its daily oil supply. With lightning-like suddenness the Suez Canal has been blocked for an indefinite period and the Iraq pipeline has been sabotaged with equal effectiveness. Simultaneously the government of Saudi Arabia has shut off the shipment of oil to England and France through the Trans Arabian pipeline.

It is obvious that the economy of Western Europe will be disrupted substantially during the next few months until the industry is able to rearrange its supply lines.

Equally obvious is the fact that the economy of Egypt already has suffered a serious blow from which it will not recover fully for many years. Repercussions of President Nasser's unilateral action in abrogating its contract with the Suez Canal Co. and his nationalization of the canal will be felt by the people of Egypt at all economic levels. By his action Mr. Nasser has set in motion events which will delay seriously, rather than promote, the welfare of his people which he has professed to hold dear.

The people in other Arab nations also will suffer economic dislocation. It is not known at this writing how long it will take to rehabilitate the IPC pipeline destroyed by saboteurs. Some estimates are that the line cannot be put into full service in less than six months. Since northern Iraq fields depend on this line for their outlet, it is necessary that production from Kirkuk and adjacent fields be reduced by nearly a half million barrels daily.

Iraq government revenues will fall. Oil-field employment will be curtailed. Public works, including irrigation projects, will be retarded or shut down. Virtually everyone in the nation will suffer to some extent.

To a lesser degree there will be economic difficulties in nations producing oil which moves entirely by tanker from the Persian Gulf. With longer tanker hauls, it will be necessary for the industry to rearrange its supply lines and take more oil from the West, less from the Middle East.

When any nation tears up its contractual obligations with other nations or with industrial organizations, it always weakens its position in the world. When international treaties are torn up, wars sometimes begin. When business contracts are torn up, the sources of capital dry up. Trade with others is curtailed. Development of natural resources is halted or seriously retarded. The standard of living in the nation which breaks its contracts declines. It may happen that the régime falls as a direct result of its action.

When Premier Mossadegh tore up Iran's contract with Anglo Iranian Oil Co., his government was weakened to the point that it was doomed to fall. National income declined to a catastrophically low level. The people suffered.

Now the people of Egypt will suffer in a similar manner. Economic losses are both immediate and long-term.

More important than the immediate consequences to Egypt are the more distant effects on the nation's economy. It is clear that the international petroleum industry will not be content to depend on Suez as a primary supply line between the Persian Gulf and the markets of Western Europe and North America. The industry cannot put so many eggs in one basket when the basket has proved unreliable. Future canal revenues will be lower than if the nationalization had not taken place.

It will, of course, take time to by-pass the canal, but it is a job which the industry must undertake. New pipelines traversing new and safer routes will be required. The tanker fleet will be augmented by the construction of super-tankers which can go around the Cape of Good Hope economically. Alternate supply sources in the Western Hemisphere will be built up by greater drilling activity in Venezuela, in the United States, in Canada, and in other promising oil-producing areas.

The Middle East crisis has proved the recent national petroleum policy in the United States a wise one. With a reserve producing capacity on the short-term basis of perhaps two million barrels daily, the domestic petroleum industry in the United States is able to supply its own needs temporarily and, in fact, make some contribution to the needs of Europe. The Western Hemisphere can, in fact, supply the oil deficit of the Eastern Hemisphere as it did before the spectacular development of Middle Eastern fields.

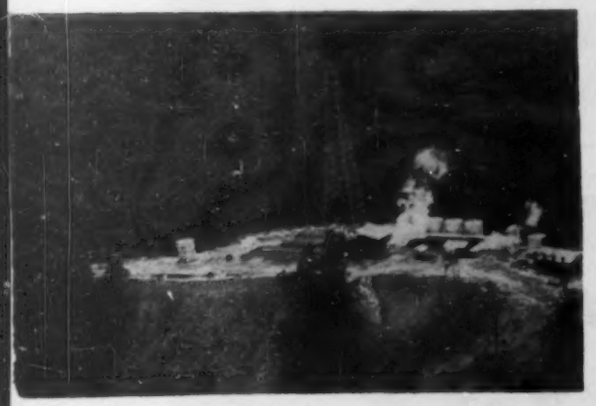
With the interruption in Middle East supply, oil men are looking closely at Latin America as a safer source for Western fuel needs. A combination of new and liberal oil legislation, plus recent encouraging wildcat results, means Colombia will play a leading role in the world's search for oil

View of Shell's platform for the drilling of the Yarigui directional wells, located in the middle of the Magdalena River. Seven wells have been drilled directionally. They are now producing 4,425 b/d and will be stepped up to 10,000 b/d soon.

New Era Seen in Colombian Oil Development

By E. Ospina-Racines

Leading Colombian oil executives are shown at a reception held in Bogota recently by Oil Well Supply representatives. From left to right: J. A. Warder, general manager for Shell in Colombia, R. Arange, special assistant to the president of Ecopetrol, C. Gutierrez, member of the board of Ecopetrol, F. F. Murray, president of Oil Well Supply at Dallas, and E. H. Clayton, general manager in Colombia for Cities Service.



Copet's (Mobil-Texas) Esperanza 1 wildcat will test a structure said to have a 30,000 acre closure. For location see No. 12 on Fig. 1.

COLOMBIA offers great prospects of becoming a more important world oil supply source. In Latin America there are only three oil exporting countries, Colombia, Venezuela and Trinidad. Colombia contributes currently a modest 92,000 b/d to the world market-beet. Colombia is in the Western Hemisphere, and of strategic importance now.

Colombia's oil economy is depicted statistically in the accompanying Table I. As may be seen, current oil output for the first nine months of 1956 was 123,115 b/d, 14% over the 1955 average of 108,007 b/d. The increase is due principally to the Texas Velasquez field, shown on the accompanying map—now producing 25,701 b/d against 10,863 b/d last year. Texas placed in operation a 12-inch, 112-mile crude pipe line this year which goes via the Andian common carrier 428 miles to Mamonal export terminal. Velasquez is the farthest field inland in Colombia which exports oil.

It is significant that this field, which is increasing its oil production and soon will be around 30,000 b/d, was discovered in 1946, some ten years ago, and oil exports only started in 1955—or nine years and 96 wells later. In general it takes from five to ten years to develop sufficient volume to make a field commercial and to build a pipe line to tidewater, based on the fields discovered to date in Colombia.

As may be noted, most are located from 200 to 428 miles inland. The Cicuco field indicated is a new oil strike in Colombia just recently announced, which is located near the Sagoc pipe line and export terminal. Such a field may be developed and placed in commercial production within one or two years, due to its location.

Colombia's oil development is carried out by companies given in the accompanying list. There are eleven operators engaged in exploration and/or production, and twenty-four in other oil industry activities. Colombia's oil output is obtained from 19 oilfields. Operators thereof and their current production are shown in the map. Of the 19 fields the eight major ones are:

MAJOR COLOMBIAN PRODUCING FIELDS AND OPERATORS—1956

Operator	*Field*	*Sept. 1956-B/D*
Shell	Casabe	32,295
Texas	Velasquez	25,701
Ecopetrol	La Cira	18,327
Colpet	Tibu-Tert	15,336
Colpet	Tibu-Cret	5,126
Ecopetrol	Infantas	7,491
Shell	Yarigui	4,425
Colpet	Rio de Oro	3,095

A total of 38 fields has been discovered in Colombia since 1916. There are 19 in production now, as indicated on the map. Some fields indicated need further drilling to be placed on production. Texas is going ahead with a pipe line to produce the Palagua field just north of Velasquez. The discovery well for Cicuco field tested as high as 672 b/d of 43 API oil and the second well is now drilling. Loffland Bros. are the contractors. Shell's Yarigui field is a recent major discovery and its oil output, now at 4,425 b/d, may soon pass the 10,000 b/d mark.

As shown in Table I, as of December 31, 1955, a total of 1.354 billion barrels of oil had been discovered in Colombia. Current reserves are of the order of 650 million barrels, subtracting 703 million barrels produced since 1921. Wildcatting in Colombia started as early as 1907 on the Carib-

bean coast near Barranquilla and to date 2,900 wells have been drilled throughout the country. Colombia's oil discovery record 1907-1956 may be summarized thus: 234 wildcats drilled in 173 oil structures—and 38 fields discovered of which 19 are now producing. On a per well basis the total oil discovered to date averages 467,000 barrels per well.

The deepest well, Buchado well, drilled by Richmond in Colombia's Choco Pacific area, was taken down to 15,539 ft. into the Eocene. Other deep tests indicated on the map are: Texas' Guanegro 13,920 feet; and La Fiebre, 13,580 feet. The fourth deepest is Llanito 1, drilled to 13,561 feet by Ecopetrol in 1955, just north of La Cira field in De Mares. It may be completed in the upper zones as a discovery and producer. No. 2 on the map is a dry hole; 1 drilled to 13,107 feet last June. This was a Socony-Mobil test and the first one on Colombia's southwest Pacific coast. Mobil surrendered three surrounding concessions following this test.

No. 3 on the map is Colpet's (Mobil-Texas) Cicuco discovery, drilled to 8,115 feet which tested initially around 300 b/d of 43° API oil. This will be one of Colombia's major discoveries in 1956. As may be seen from the map, with the Dificil field and the Floresante field, the Cicuco discovery rounds out a vast prospective oil zone on Colombia's Caribbean coastal area ready to be proved up by further drilling.

At No. 9 on the map, Intercol is drilling its Campeche 1 wildcat, the second in this block, a joint venture with Mobil. At No. 7 area a Drake well depth strike at Tolu was reported while drilling a water well. At first the strike was discounted as crankcase oil dumped in the well, but subsequent inspections of the oil proved to be a 16° API crude. The area was solicited in concession by the official oil enterprise Ecopetrol and John W. Mecom, an independent U.S. oil operator, who has an option to develop the concessions obtained with capital contributed 25% Ecopetrol, 75% by Mecom. Profits, if any, are to be divided

TABLE III

DIRECTORY OF THE OIL COMPANIES IN COLOMBIA

Company	Identification	Principal Activity	Principal Executive
EXPLORATION & PRODUCING			
1. Empresa Colombiana de Petroleos	Ecopetrol	Production & Expl.	F. Puyana
2. Concesionaria de Petroleo Shell-Condor	Shell	" " "	J. A. Warder
3. Texas Petroleum Co.	Texas	" " "	G. A. Severson
4. Colombian Petroleum Co.	Colpet	" " "	J. O. Bower
5. International 1 Petroleum (Colombia), Ltd.	Intercol	" " "	M. Brisco
6. Richmond Petroleum Co.	Richmond	" " "	I. Bonillas
7. Mobil Oil Co. de Colombia	Mobil	Exploration	H. E. McAuliffe
8. Col. Cities Service Pet. Corp.	Colcitco	"	E. H. Clayton
9. John W. Mecom	Mecom	"	R. Noguera
10. Colombian Development Co.	Coldev	"	J. W. Raisebeck
11. Forest Colombian Corp.	Forest	Second Recovery	V. Rose
CRUDE PIPELINES		**Distance—Mi**	
1. Andian National Corp.	Andian	335	P. R. Ratliff
2. South American Gulf Oil Co.	Sagoc	254	A. McNulty
PRODUCTS PIPELINES			
1. Cleoducto de Cundinamarca		87	J. Alvarado
2. Oleoducto de Antioquia		112	J. E. Velez
3. Empresa Colombiana de Petroleos		60	F. Puyana
4. Oleoducto del Pacifico		61	L. E. Sardi
MARKETING			
1. Esso Colombiana	Esso	Fuels, Lubes & Specialties	A. W. Silenzi
2. Shell de Colombia	Shellco	" " " "	B. G. A. Stark
3. Colombianos Distribuidores de Combustibles	Codi	" " " "	P. E. Pareja
4. Texas Petroleum Co.	Texaco	" " " "	M. Blau
5. Mobil Oil Co. de Colombia	Mobil	Lubes & Specialties	C. H. Jooper
6. Cia. Colombiana de Gas	Colgas	LPG-Appliances	A. Lobo-Guerrero
SERVICES			
1. Schlumberger Orient S.A.		Logging, etc.	J. E. Gartner
2. Geophysical Service Inc.		Geophysics	M. Holbert
3. Seismograph Service Corp.		"	J. Nash
4. Petty Geophysical Co.		"	H. Dawson
5. Cia. Halliburton de Cementacion		Cementing, etc.	W. E. Nilsson
6. Colombian Oil-News Digest & Oil Drilling & Prod. in Colombia		Scout Reports	E. Ospina-Racines
CONTRACTORS			
1. Bechtel Corp.		Refinery	W. E. Lake
2. Williams Bros. Sudamericana		Pipelines	D. Louthan
3. Loffland Bros.		Drilling	J. W. Raisbeck
4. Sante Fe Drilling Co.		"	S. Collester
5. Fields Engineering & Service Co.		"	J. R. Clark
6. Colombo-Americana de Ingenieros		General	D. Vargas
7. Intercolombiana Ltda.		General	J. Velez

TABLE II

OIL INDUSTRY PAYMENTS PER BARREL TO GOVERNMENTS
MIDDLE EAST & CARIBBEAN
(U.S. cents per barrel)

Year:	1950	1951	1952	1953	1954	1955
Middle East Countries:						
1. Iraq	56.1	61.3	65.8	62.9	68.0	90.6
2. Saudi Arabia	56.1	55.8	56.3	53.8	51.7	—
3. Kuwait	9.3	13.98	60.5	61.0	62.5	70.3
4. Qatar	8.1	18.4	27.8	36.1	56.4	89.4
5. Iran	—	—	—	—	86.8	81.6
6. Bahrein	18.0	26.6	38.6	46.1	100.0	—
S.A. & Caribbean						
1. Venezuela	66.6	76.3	74.3	78.8	79.9	70.5
2. Colombia	50.1	64.8	65.3	54.1	53.5	—
3. Peru	68.5	69.5	73.4	61.8	65.0	—
4. Trinidad	47.3	62.1	72.2	66.0	65.6	71.0

TABLE IV

Columbian Land Holdings—October 31, 1956

Operator	Number of Properties & Hectares No. Producing Area		No. Exploration Area		Total Property No. And Area—Hectares	
Ecopetrol & Cities Service	1	512,000 h.	1	400,000	2	912,000 h.
Colpet (Mobile-Texas)	1	186,805	6	229,958	7	416,763
Shell-Condor	4	163,894	11	439,512	15	603,406
Texas	2	176,889	14	736,140	16	913,029
Intercol	2	99,814	29	1,097,040	31	1,196,854
Mobil	0	0	6	496,409	6	496,409
Guiberson	0	0	1	15,108	1	15,108
Richmond	0	0	1	29,718	1	29,718
John W. Mecom	0	0	4	200,000+	4	200,000+
Intercol-Mobil	0	0	6	239,911	6	239,911
	10	1,139,402	79	3,883,796	89	5,023,198

+ Mecom holds an option from Ecopetrol concession bids; all others represent firm contracts with the Government.

Fig. 1. Map showing principal development and exploratory locations in Colombia.

TABLE I

CURRENT ACTIVITIES OF PRINCIPAL OIL OPERATORS IN COLOMBIA
(Official Data)

		Ecopetrol	Shell	Colpet	Texas	Intercol	Richmond	Mobil	Coldev	Total
Oil Output—b/d—1955		30,833	40,282	25,885	10,863	144	0	0	0	108,007
	Sept. 1956	29,343	40,562	25,923	25,938	339	0	0	0	123,115
Wells Producing—Sept. 1956		1,114	400	293	81	5	0	0	0	1,183
Gross Oil—Million Barrels (To 12/31/55)	Output	468.9	114.4	113.1	10.1	0.273	0	0	0.011	703.783
	Reserves	120.0	227.8	146.4	152.0	3.1	0	0	1.0	650.3
Total Oil Discovered in Colombia—Million Barrels (To 12/31/55)		588.9	339.2	259.5	162.1	3.3	0	0	1.0	1354.0
Rigs Active—10/1956	Exploratory	1	1	2	1	1	1	0	1	8
	Field	2	1	7	5	0	0	0	0	15
Completions—	1955	20	20	42	27	4	0	1	1	125
	9 Mos. 1956	14	9	29	11	3	0	4	0	70
Footage Drilled—	1955	142,638	95,029	252,533	182,655	34,143	0	13,972	2,986	723,956
	6 Mos. 1956	32,889	81,221	111,737	93,276	12,526	0	31,927	0	363,576
Runs to Stills b/d—	1955	34,066*	0	991	1,073	2,598**	0	0	0	38,728
	Aug. 1956	40,742*	0	1,165	1,219	3,104**	0	0	0	46,230
Oil Exports—Million Barrels		1.10	14.61	9.21	.45	0	0	0	0	25.37
1955	Dollars	2.24	31.23	26.93	1.09	0	0	0	0	61.49

*Crude produced by Ecopetrol and Texas refined by Intercol.
**Crude produced by Texas, refined by Intercol.

the same way. Mecom pays a 5% overriding royalty to Ecopetrol for the option, plus the regular 13% for oil up to 100 kilometers from tidewater, to the Government.

On concluding the deal Mr. Mecom invited about 14 Ministry and Ecopetrol officials, including the Minister and the President of Ecopetrol, to fly in his private plane and visit Mecom's operations in Texas, also the world's deepest well in Louisiana, the Cardwell Mfg. plant at Wichita, New York and back to Bogota. The group was very appreciative and most favorably impressed.

At No. 8 a joint Texas-Shell wildcat is being prepared to go from 10,000 to 15,000 feet in a block originally tested by Socony, back in 1937-1940 with seven wells, one to 10,740 feet. Two small shallow producers, both non-commercial, were obtained. Shell took up the block and drilled three wildcats in 1955 and 1956, to 12,897 feet, 10,953 feet and 10,518 feet, the latter abandoned May 1956. The new Texas-Shell joint wildcat is encouraging evidence of the prospects of the original Restrepo concession.

The Floresanto block (No. 6 on the attached map) was originally discovered in 1946 by Socony and subsequently surrendered. Some 11,000 barrels of 51° API oil were produced from this pool. The block was reduced to 15,000 hectares and obtained in concession in the name of A. Guiberson. It is reported that independents of Houston, E. W. Bartlett and D. Vasser of New Orleans, have obtained the rights and have concluded a deal to take over the H-30 Ideco rig on location and further drilling is planned. (Colombian Development Co.) drilled a well with Texon Drilling Co. of Corpus Christi to 2,986 feet. The pool is said to be good with further drilling for more than 1 million barrels of oil.

Great interest has been manifested in Colombia's great eastern plains or Llanos region—located south of Venezuela's Barina area. All the majors have solicited large blocks in concession. As may be seen from the map, some drilling has taken place in the mid and southern parts of the Llanos—where is found half of Colombia's prospective oil land, some 25 million acres and 500 miles from tidewater. Intercol and Shell drilled in the mid-Llanos and Texas Co. drilled several wells in the southern region at No. 10. West of this location, Texas has recently signed up a 500,000 acre tract.

At No. 11 some 8,900 feet above sea level Intercol drilled a wildcat in 1948 to Eocens-Upper Cretaceous at 6,983 feet. It was later abandoned. Recently Texas Co. applied for some 500,000 hectares of land in concession covering Bogota sabana at 8,000 feet above sea level. The object is to test natural gas possibilities in the sabana. A little above No. 11, the iron and steel enterprise Paz del Rio while core-drilling encountered a strong flow of natural gas and two concessions have been solicited in the surrounding area.

At No. 12 Colpet is drilling its Esperanza 1 wildcat using natural gas piped 50 miles from the Barco concession. This is a huge

(Continued on page 56)

The pace of oil operations in Venezuela is up in all sectors. Exploration is rising with the new concessions recently granted, many of which are now planning to drill their new areas in Lake Maracaibo. Production has hit a new peak of more than 2,500,000 b/d, and seems likely to be stimulated by the Suez crisis to even higher levels, limited only by availability of crude.

VENEZUELAN OIL BOOM

EXPLORATION in eastern Venezuela received pleasant news recently, when Sinclair Oil Corp.'s affiliate, Venezuelan Petroleum Co., announced a discovery in eastern Venezuela, not far from Sinclair's Santa Barbara field in the Greater Oficina area of western Monagas province. The discovery well, Aguasay 3-1, produced 27,000 barrels in 25 days. Production is of 36 API crude from Oficina sands of good porosity of Oligocene age. The "T" and "S" sands are producing at present. The "T" sand, 50 feet thick and producing 687 b/d, came in at 1,355 feet. The drillers came up about 100 feet and perforated the "S" sand for around 600 b/d. There are at least six other sands indicated on the electric log which as yet have not been tested. Structure maps indicate about 900 acres (depending on geology) of productive area.

Aguasay 3-1 is located about 27 miles from the Santa Barbara-La Cruz 16-inch pipeline, owned 1/3 by Sinclair. An 8-inch connecting line is planned. Another wildcat, Aguasay 4, is drilling about 4 miles due west. Aguasay No. 1 and 3 are about three miles south. No. 1 was a producer at about 100 b/d; No. 3 has gone mostly to gas. An offset to the discovery, Aguasay 3-2, is now drilling.

A total of 1,005 oil and gas wells was drilled in Venezuela in the first nine months of this year. The Shell group, with 307, drilled the largest number; Mene Grande was next, with 259; and Creole Petroleum Co. third, with 116. A total of 12 companies drilled.

Oil development wells totaled 840; 45 were oil wildcat wells, while seven others were gas wells. A total of 58 of the development wells were dry, and 55 of the wildcat wells were dry.

The major news of the year, however, was the long-awaited grant of concessions in Venezuela. About $408 million was received by the government in new concession awards, enough to trigger an announced expansion in the government's public-works program. It even caused a fluctuation upward in U.S. banking activity, as large sums were transferred to Venezuela in preparation for the grants.

The locations of new grants have been covered previously in WORLD PETROLEUM (September 1956, p. 94). The remaining awaited grants in the Barinas area, in the Gulf of Paria (considered one of the best prospects for early exploration) and in the eastern states of Monagas have not yet arrived, although extensive applications have been made. Many companies felt that the initial price in Lake Maracaibo was too high. Many also feel that the reported bonus minimums in Barinas of over $65 per acre are too high, despite the fact that this area is the scene of the major recent discoveries, made by Sinclair Oil Co. In May 1953 this company discovered the Barinas field, now estimated as at least 66 million barrels of reserve, with its 1 Sinco well. The Barinas field is in the Apure basin, located far inland to the south and east of Lake Maracaibo. The only other discovery in the basin was by Socony Mobil Oil Co. in 1945 at San Silvestre, which is located north and west of the Sinclair discovery. The cost of a pipeline from this area is estimated at around $25 million, and the companies currently are planning a 240-mile line to the coast.

Considerable realignment of concession grants has taken place. Venezuelan Leaseholds C.A., headed by Enrique Brandt, has farmed out its new Lake Maracaibo concession area to five American independents, including Tennessee Transmission Co., Union Oil and Gas Corp., Lion Oil Co., Murphy Corp., and San Jacinto Petroleum Corp. The companies reportedly paid around $3 million for a half-interest in the company's concession. That amount exactly

(Continued on page 58)

DRILLING IN VENEZUELA — 9 MONTHS 1956

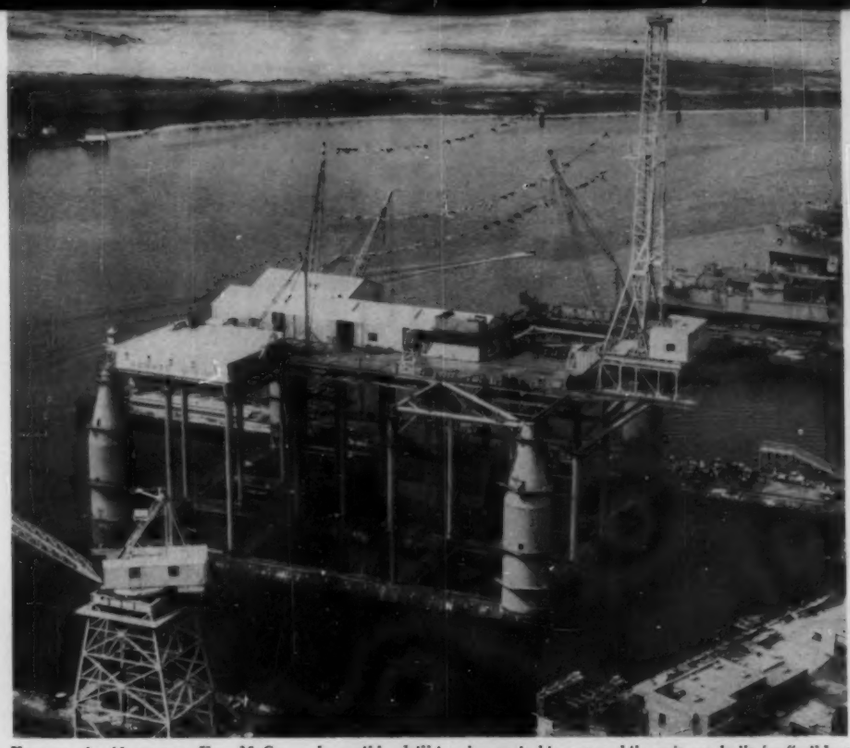
Company	OIL		GAS		DRY		TOTAL
	Development	Wildcat	Development	Wildcat	Development	Wildcat	
Crude	93	9	—	—	4	10	116
Mene Grande	223	16	1	1	11	7	259
Shell group	287	3	—	—	13	4	307
Sinclair	34	5	—	—	2	5	46
Texas	24	2	—	—	4	2	32
Los Mercedes	25	4	1	—	11	17	58
Socony	42	—	—	—	1	—	43
Atlantic	9	6	—	—	2	8	25
Phillips	37	—	3	1	—	2	43
Richmond	51	—	—	—	3	—	54
Pantepec	2	—	—	—	1	—	3
Talon	13	—	—	—	6	19	19
TOTAL	840	45	5	2	58	55	1,005

REFINERY PRODUCTION IN VENEZUELA 1956

(Cubic Meters)

	August	Cumulative Jan.-Aug.
Crude refined	3,333,577	22,514,518
Crude mixed with refined products		348,487
Reprocessing and other		91,209
Refinery Production		
Fuel oil	1,765,703	12,719,473
Diesel oil	433,126	2,827,248
Gasoline and naphtha	432,087	2,879,776
Gas oil	253,003	1,564,472
Kerosine	94,363	713,992
Residual	59,106	494,323
Aviation gasoline	20,764	184,704
Gas	34,367	213,245
Lubes	14,574	129,859
Asphalt	48,348	200,206
Other	184,217	982,134
Losses	2,307	44,682
TOTAL	3,341,965	22,954,214

Unique Kerr-McGee Design For Offshore Drilling



Kermac rig 46, newest Kerr-McGee submersible drill ing barge, is biggest mobile unit yet built for "wildcatting" for oil and gas in the Gulf. Dressed in her "Sunday best," christening ceremonies took place at Ingalls Shipbuilding Co.'s yard in Pascagoula, Miss. This aerial view shows the overhanging substructure from which six wells may be drilled "over the side" from the same location. Designed to drill in water down to 70 feet, the Ideco derrick can "double in brass" as a construction boom for building protection platforms around the wellhead.

By James W. Calvert

THE submersible drilling rig has become standard equipment for "wildcatting" in the offshore oil and gas fields off the Texas and Louisiana coast, but it has presented marine architects with their greatest headache since seafarers first conceived the idea of building ships of iron instead of wood.

The offshore rig consisted simply of a flat-bottomed barge with columns of steel atop of which was mounted a platform containing drilling machinery, power units, quarters for the drilling crew, and warehouse facilities for mud, cement, pipe, water, fuel, and other necessary drilling supplies. For its day, it marked quite an advance, but progress continues.

That first submersible unit, built in 1950, is still in service. Since that time, however, some 25 mobile drilling structures have been put into operation. They are of varying types and designs, each built with the hope of achieving the ultimate in stability.

The problem of the marine architects has been to create a craft buoyant and stable enough to be towed with safety at sea, which could be submerged and thence remain immovable for long periods of time while a well was being drilled from its deck. The greatest single task for the designers was to devise a means which would prevent lateral movement while the structure was in position for drilling.

This has been accomplished by various mechanical means. When it was found that the conventional flat-bottomed barges would slip laterally under certain conditions when submerged, the engineers added stabilizing pontoons actuated by hydraulic rams which would press against the floor of the ocean to hold the rig rigidly in place.

Other devices have consisted of "spuds" or piling which could be driven into place after the barge had been submerged, or with hydraulic and electric jacks which literally haul the drilling platform into place like a giant elevator after the "spuds" have been forced downward to a solid foundation in the ground.

Thus the designer of each new type of offshore mobile drilling rig hopes that his is the answer to the stability problem. Engineers for Kerr-McGee Oil Industries, Inc. believe they have found it in the unique design for Kermac rig 46, a huge new submersible barge which was completed last month in the Ingalls Shipbuilding Corp. shipyard at Pascagoula, Miss.

Kermac rig 46 left for its first assignment in block 59, East Cameron field, under contract to the CATC group (Continental, Atlantic, Tidewater, Cities Service) after christening ceremonies in the Ingalls yard. A "sister ship" of Kermac rig 46 is now nearing completion by the American Bridge Division of U. S. Steel Corp., and will go to work for Phillips Petroleum Co. shortly after the first of the new year.

The new Kerr-McGee design depends for stability upon its sheer size, 202 feet by 242 feet, and by the grid pattern of pressurized tubes, or cylindrical members, 14 feet 6 inches in diameter, which form the submersible base of the structure. Afloat, the rig is the highest vessel ever built. The working level of the drilling rig is 100 feet above the base line of the barge. This will permit the rig to operate in water up to 70 feet in depth. The derrick rises another 150 feet above the deck.

The designers believe the same type of rig should be built for waters of 100 feet, or simply by extending the upright columns and increasing the overall size proportionately.

At the four corners of the rig are "bottle-shaped" stabilizing columns which are cylinders 22 feet in diameter at the base and rising to a point 64 feet 6 inches above it, then tapering off in conical shape for the upper 36 feet of their height. They extend approximately six inches below the bottoms of the base barge.

Supplementing the four stabilizing columns are 20 support columns, each 42 inches in diameter, and two columns which are 48 inches in diameter.

On top of this structure is the "texas deck," 181 feet at its widest point and 228 feet 6 inches at its longest. This platform is T-shaped, with crew quarters, engine housing, and storage facilities situated on the crossbar of the "T," and the drilling mast and drawworks located at the base. Because of the length and breadth of the rig all superstructure is located on one deck level, except for the derrick floor.

An unusual arrangement of the drilling machinery eliminates the need for the conventional "slot" in the hull of the barge. The drilling superstructure, with mast, drawworks, rotary table, and other drilling equipment, is located on a cantilevered structure extending over the end of the platform; thus wells are actually drilled over the side—rather than below—the barge.

Another aerial view of the Kermac rig shows the superstructure consisting of crew quarters and heliport (right) and the engine rooms and storage facilities on the cross bar of the T-shaped deck. The rig is as big as an eight story building covering two-thirds of a city block.

A still bigger platform is shown in this progress photograph of Kermac rig 47, still under construction at the American Bridge Division shipyard of U. S. Steel Corp., Orange, Texas, which shows one-half the structure and detail of the arrangement of pressure tubes forming the barge hull. The rig is so big that it had to be launched in two sections and welded together in the water. Kermac rig 47 was towed from Orange to Sabine Pass, Texas, for final assembly; from thence it will be towed at sea to Pascagoula, Miss., for outfitting.

Six wells can be drilled from one location. The cantilevered substructure can be skidded 8 feet transversely and 12 feet longitudinally to fixed positions for the multiple drilling.

Still another unique feature of Kermac rig 46 is the Ideco 151-foot drilling mast, which can double as a construction boom for setting a well production platform. This was made possible by the arrangement of the cantilevered substructure. When it is to be used as a construction crane, the mast simply is skidded onto the main deck of the rig to allow for clearance in setting the protection platform in place. The mast has 750,000-pound hook capacity, and is built to withstand 130-mile-an-hour winds. As a construction boom, it has a capacity of 125 tons.

The rig is full diesel-electric powered, with three General Motors EMD 8-567-C 875-hp engines each driving two 500-kw dc generators. Traction motors of 625 hp each provide unit drives for mud pumps, drawworks, and rotary drive, taking their power from the main bank of diesel-electric generators. There are two Emsco D-1000 mud pumps, each powered by two electric motors. The Emsco EDA double-drum drawworks with a 1,600-hp rating is driven by two unitized motors while the Emsco type PJ 27½-inch rotary table is independently driven by another 625-hp motor.

An Emsco B-14 pump is electrically-powered for mud-mixing services.

The auxiliary generating system consists of two Caterpillar D-397 500-hp engines, each driving a 350-kw 440-volt ac generator. This provides power for lighting and other electrical services. All engines are keel-cooled.

Like all mobile drilling units built for the Gulf of Mexico, Kermac rig 46 is completely self-contained. The power units, for example, could supply the needs for a city of 6,000 population. Crews quarters are air-conditioned, and provide sleeping accommodations for 50 men. There is a large galley with walk-in cooler and deep freeze, a well appointed dining room, recreation room, office, and radio room; and the house top is used as a heliport.

In the base of the barge is liquid storage for 3,950 barrels of drilling water, 780 barrels of potable water, and 780 barrels of fuel oil.

Bulk and weight material is stored in a 2,400-cubic-foot bin, and there is additional deck space for storage of 5,000 sacks of mud. Cement and mud additives are stored in a separate room measuring 37 feet by 50 feet.

As for the well string-up, equipment includes an Ideco crown block with seven 55-inch-diameter sheaves, an Emsco MA-6-60 traveling block with six 60-inch sheaves, and a Byron Jackson model 5450 hook of 450-ton capacity.

The Kermac rig 46 is so big that it had to be constructed in two sections and welded together in the water because it is as large as an eight-story building covering two-thirds of a city block, and it represents nearly eight million pounds of steel. Conventional building ways were just not designed for such an enormous structure.

The builders of its "sister ship," which is to be christened Kermac rig 47, had an additional problem of logistics in that the two sections had to be towed separately for 50 miles to rendezvous for final assembly at a point closer to the ocean than the U.S. Steel Corp.'s yard in Orange, Texas.

After the two sections are assembled at Sabine Pass, Texas, the completed unit will be towed at sea to the Ingalls yard in Pascagoula for final fitting out.

The manner in which the two sections of the huge structure were welded together in the water is an interesting problem of engineering. With the lower hull members riding about seven feet in the water, cofferdams were constructed, the makeup sections were slipped into place, water was pumped out, and the parts welded from the inside. The deck strips were dropped into place by cranes and welded to complete the deck.

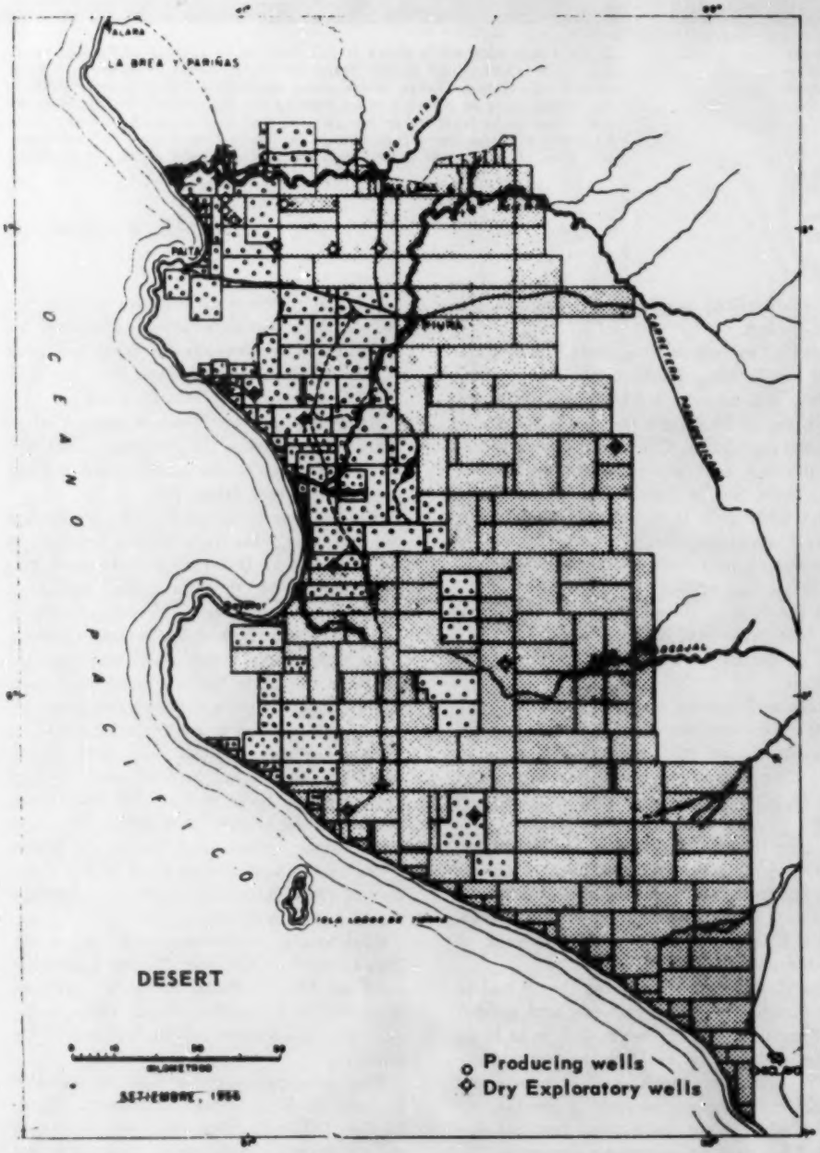
The designer of the two new Kerr-McGee rigs was Paul A. Wolff, chief marine engineer for Kerr-McGee Oil Industries, Inc., who had a hand in building the original Kermac submersible barge. He began work on the new design early in the summer of 1955. Actual construction of Kermac rig 46 began in March of 1956.

Christening ceremonies were held at the Ingalls yard on October 24, and the sponsor was Mrs. Colburn J. Colby, wife of Kerr-McGee's marine construction manager who had supervised the building of the giant rig.

The principal address was by Senator Robert S. Kerr, board chairman, Kerr-McGee Oil Industries, Inc., was dedicated the rig "to the service of our country in the development of its peacetime economy and to its security in national defense." END

Oil Developments and Prospects on the Pacific Coast of South America

By Dr. Juan E. Rassmuss



Concession map of Sechura Desert in Perum showing the retained (dotted) and abandoned concessions and wildcats.

Oil development in South America has acquired new importance for supplying the rapidly increasing demand of the western world, due to the current Middle East unrest.

Venezuela's output has topped the 2.5 million b/d mark. On the Atlantic side of South America, where the largest consumer nations, Argentina with a demand of about 220,000 b/d and Brazil with a demand of 180,000 b/d, are located, national production, because of political policy, remains restricted and in 1955 supplied about 38% in Argentina and 3% in Brazil of domestic demand.

Colombia's output rose to 119,176 b/d in the first semester of 1956 and exceeded 125,000 b/d in August of this year. Liberalization of the oil law by the new regulations of August 1955 and the entrance of new foreign companies, including Cities Service Oil Co. and Forest Oil Corp. of Bradford, Pa., in the former Mares concession area of the government's Empresa Colombiana de Petroleos, John W. Mecom of Houston on the Caribbean coast, and Louisiana independents in the Sinu river area, will stimulate exploration. Completion of the pipeline from Texas' Velasquez field in the upper Magdalena to Galan, connecting it with the Andean pipeline to the Caribbean coast, has permitted an increasing output from this important field.

Exploration on the Pacific coast of Colombia, where the Tertiary coastal belt continues from northern Peru over Ecuador to Colombia and Panama, has still not met with success. Richmond Petroleum Co.'s wildcat in the northern part of the coastal region at Buchado in Choco department, drilled in 1954, was dry at a depth of 15,539 feet. The Chagui wildcat in the southern part near Tumaco, drilled by Mobil Oil and completed in 1956, also was dry at a depth of 13,107 feet.

Ecuador's production from its coastal fields, which rose considerably in 1955 to 3.5 million barrels from around 1,450 producing wells, remained steady in 1956 with an average of 9,529 b/d during the first semester of this year, after having topped 10,000 b/d in January. Number of completed wells amounted to 93 in the same period with a total footage of around 170,000 feet, and 85 wells struck oil. But total proven reserves are still only about 25 million barrels, and no important new discoveries have been made. Standard Oil of California, through its Ecuadorian subsidiary, is the only active company in new exploration.

In Peru output amounted in 1955 to 17,245,534 barrels or 47,248 b/d from around 3,350 wells, almost equal to the preceding year. Domestic demand, however, topped 13,043,580 barrels, threatening to exceed shortly domestic production. Exploration has therefore been active, but results have so far not added any considerable amount to reserves. In the principal producing field La Brea-Parinas, of International Petroleum Co., secondary recovery by water flooding and sand fracturing has

been the predominant feature. Output in the first semester of 1956 amounted to 27,746 b/d plus 2,577 b/d of condensate.

Output of the Lobitos fields, including the joint operation areas operated by International, amounted in September 1956 to 554,356 barrels of crude. Cia. Petrolera Lobitos continues to increase production from its still untapped reserves.

Empresa Petrolera Fiscal's output, which amounted in 1955 to 592,384 barrels or 1,623 b/d, has augmented in 1956, to 2,152 in September.

Ganso Azul's output in Eastern Peru decreased considerably in 1955 to 719 b/d. In 1956 it remained about the same.

In the first six months of 1956 total output of Peru increased slightly to 48,372 b/d of crude. 106 wells were completed, of which 85 struck oil and besides 11 wells were drilled for water flooding.

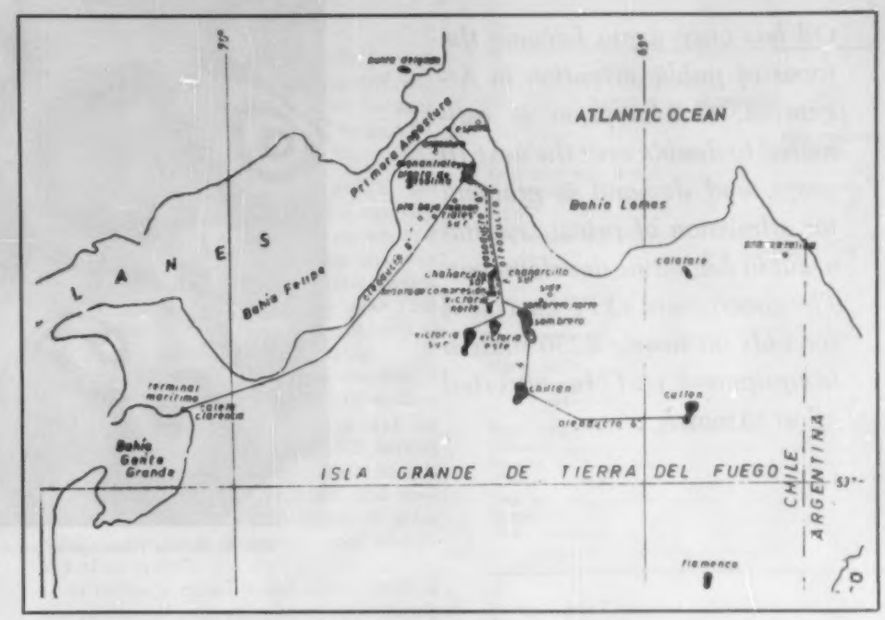
In Sechura the principal exploration prospect on the coast in recent years, Gulf Oil Corp., which formerly had done no drilling, completed its first two wildcats in 1956. PG 39, the first well, was abandoned in June at 4,303 feet depth, and a second wildcat, PG 11, hit basement in 7,128 feet. Texas, after having drilled in 1955 three wildcats in Sechura, suspended further drilling and moved off the rig. Richmond suspended operations last year. International, the only company still active in Sechura, is testing its former abandoned wildcat Viru 5 for gas.

Because of the disappointing results of the 22 wildcats in Sechura, concession area has decreased to about one-fourth or around 1.1 million acres, as shown on the accompanying map.

In the northern part of the coastal area, north of the producing fields and in the interior, Peruvian Pacific Petroleum Co., subsidiary of Cities Service and Richfield Oil Corp., drilled a total of 10 wildcats. Only two struck oil in the Mogollon conglomerate, a shoreline facies of the lower Eocene Salinas formation. Output of those two wells amounted to around 200 b/d together, yielding in the month of September 6,319 barrels in total. Pacific Petroleum is reportedly suspending its operation in northern Peru.

Petrolera Amotape, an independent company, which holds good prospective area on the coast and adjoining the Lobitos concessions on the north, has reconditioned its former producing well Pb 90 and completed two new wells C 1 and C 2 to around 1,800 feet depth to the Verdun formation, to be put in production. The company intends to test deeper marine Salinas formations on the coast soon, which offer good prospects because of its important yield in the neighboring producing fields.

The only discovery in Peru's coastal area has been the development of the Mirador pool, south of the Chira river, which constitutes a southern extension of the southernmost Portachuelo pool of International's Brea-Pariñas field. Petrolera Peruana has drilled nine wells there to the Salinas formation. They yield a total of about 600 b/d, with the first well a gas well.



Magellanes oil fields in southern Chile (Based on ENAP's map.)

On the Peruvian continental shelf Douglas Oil Co. of California spent about $3 million on eight offshore wells. Results were poor, however, and the company has suspended operations. Production by Douglas during September 1956 was 1,930 barrels or around 64 b/d. The Peruvian government by decree of October 26 called for bidding on offshore concessions to a maximum of around 1 million acres each, according to the petroleum law, admitting applications from national bidders for a term of 60 days and from foreign companies for a term of 30 days afterwards. At present the only offshore concession is that of Petrolera del Pacifico of around 26,000 acres, which has been operated by Douglas Oil Co.

Peru's future oil development depends therefore on a successful development of the Montana, east of the Peruvian Andes. There a concession area of 14,588,601 hectares (about 35 million acres), the biggest concession area in South America, has been assembled and 15 companies hold concessions, including independents such as, Transwestern Oil Co. of Denver and Skiles Oil Corp. of Illinois.

The only producing field, Ganso Azul which was discovered in 1938, offers an excellent structure, but of very limited extension. Granite basement has already been struck in at 5,219 feet depth. Thickness of the source bed in the Cretaceous Agua Caliente formation is confined to some 500 feet. Output has so far only occasionally topped 1,000 b/d and will be increased to 2-3,000 b/d, after the Manaos refinery in Iquitos is completed, which offers the only market for Ganso Azul's crude. 18 wells have been drilled so far, output in August amounted to 16,392 barrels and in September to 32,339 barrels, fluctuating according to shipping facilities. The 48 miles 4-inch pipeline from the field to Pucallpa, a river port on the Ucayali, was inaugurated in April of this year. New barges of 12,000 barrels capacity and a tugboat of 1,600 hp. will improve shipping facilities.

To expand its activities, Ganso Azul started drilling in 1955 on the small Santa Clara dome, located about 200 miles north, farther down the Ucayali river near Orellana. The first hole had struck tool. The second hole was abandoned at a depth of 3,870 feet.

In the same Ucayali region, east of Contamana and near the probable border of the Brazilian Shield, a German syndicate in association with the Peruvian El Oriente Co. drilled a wildcat Cashiboya 1. The first hole encountered drilling difficulties, being abandoned at 3,934 feet, and the second hole on the same location, Cashiboya 1 A, was abandoned dry at 4,580 feet. A new wildcat about six miles northwest is reported to have started drilling.

Oil prospects of the Montana region are subject to proving a larger sedimentary basin and a thicker source bed for oil. The most important exploration has been carried out by Texas Petroleum Co. in the Marañon basin. Texas's first well, located on the upper Marañon at San Lorenzo near Barranca, reached a depth of 9,787 feet, and was abandoned in November 1955. The second well, about 140 miles downstream below the mouth of the Huallaga river, spudded in January 1956, but had to be abandoned in March at 9,196 feet depth due to a river flood. The third well, much farther downstream, is located at the mouth of the Tigre river into the Marañon, about 75 miles in a straight line southwest of Iquitos. It was spudded in August, and was drilled at the end of October at 8,190 feet. Geological results have not been disclosed, but Texas expected to spend during the present year about 3 million on drilling.

(Continued on page 57)

Oil has once again become the focus of public attention in Argentina. Consumption is estimated to double over the next 10 years, and demand is growing for admission of private capital to aid in Argentine development. The government's YPF has called for bids on nearly $250 million in equipment, part of a concerted effort to match . . . .

General Alfredo Intzaurqarat, president of the new board of directors of Y.P.F.

OIL GROWTH IN ARGENTINA

By Bernardo Rikles

Location of exploration crews in Argentina during 1955. Geographical Crews, Seismic Crews, Gravimetric Crews, Topographic Crews.

OUTSTANDING events in the Argentine oil industry during 1956 were mostly of a political nature. The present provisional government, although it allegedly favors private enterprise and is inviting foreign capital to invest in new industrial plants, still upholds State ownership and control in the petroleum industry.

Political parties have made a campaign issue of petroleum. Some contend that concessions to foreign oil companies may endanger the country's sovereignty, and the "bugaboos" of imperialism and foreign interference in internal affairs are brought forth to uphold State monopoly; leaders of the Democratic Party favor freedom for private capital in the Argentine oil industry.

The oil-producing states (provinces), in a special congress held last July, claimed ownership of their oil reservoirs which had been federalized by the 1949 constitution (abolished by the present government). In the same congress it was established that each province would keep for YPF (the federal government's oil company) its own oil reserves and would enter into individual royalty agreements. The organization of state oil companies as "YPF Salta," "YPF Mendoza," etc., was also suggested.

Last September a newly created board of directors, with representatives from the three armed forces and some of the oil states, presided over by General Alfredo Intzaurgarat, former YPF general administrator, took over the administration of YPF, which is chartered for State owned corporation with complete freedom for developing prospecting, exploration, production, transport, manufacture, and marketing of oil and its products in the Argentine. It is expected that this new organization of YPF may expedite its reactivation plan which calls for doubling by 1960 of present oil production. The first steps taken by the new board of directors was to appoint Ing. Bernardo Astiz (a former YPF employee) as general manager and to approve the calls for tenders for the various projects of the reactivation plan. The board is selecting among the 146 general offers received in May 1956 those companies which are to be invited to submit their best prices and credit conditions for each of the individual projects.

Prices of fuels and lubricants were frozen by the former government. Prices include taxes for the national power fund and highway construction. Marketing companies collect these taxes as agents for the government and retain the amount set by the National Power Board to cover costs and profits. In January this year the government raised prices of liquid fuels as follows:

PETROLEUM PRODUCT PRICES IN ARGENTINA

(Arg. Pesos per Liter)

Product	*Previous Price*	*Present Price*
Gasoline	1.40	2.00
Kerosine	0.90	1.25
Gas oil	0.40	1.40
Diesel fuel (Heavy distillates)	275.	580.
Residual fuel oil	220.	480.

The foregoing increases are to balance the higher prices of imported crude (since the exchange rate was raised at the end of 1955 to 18 Argentine pesos per dollar from 5 pesos) and higher costs of production, transportation, manufacture, and marketing. So far the oil companies haven't been advised as to how much they may retain. Lubricants for motor cars and general uses sell at the 1952 level, and no official new price pronouncement to balance higher production and marketing costs has been issued.

For many years exploration has been done particularly exclusively by YPF. During 1955, 21 geologic and 5 topographic crews were in service (7 doing geology, 11 seismographic work and 3 gravity work). The same number of crews was active during the 8 months ending August 30, 1956. From September 1, 1955 to August 30, 1956 the surface surveyed covered 47,342 square kilometers; 17,329 by geology, 3,669 by seismic, 14,000 by gravimetric, and 12,344 topographic. During the same period 54 exploratory wells were drilled and the following new pools were discovered:

PROVINCE	
Chubut:	Colonia Sarmiento and Canadon Ferrari
Patagonia:	Tres Lagunas, Canadon Algarrobo, Nueva Provincia
Neuquen:	Cerro Lotena, Sierra Barrosa, Esta del Medio

Table I gives the number of wells, footage drilled, and rigs in service during 1955 and the first 8 months of 1956; it also includes accumulative wells drilled, as of August 30, 1956.

Reserves estimated in July 1956 of 140 million cubic meters (882 million barrels) of crude oil and 50 billion cubic meters (1.8 trillion cubic feet) of natural gas show an increase of some 40 million cubic meters (250 million barrels) of crude over 1955 estimates and 100 million cubic meters (630 million barrels) over 1946 estimates.

Crude oil production during the first 9 months of 1956 added up to 3.63 million cubic meters (23 million barrels) and the average daily production of 84,000 barrels is expected to be increased to 86,000 barrels during coming months to boost 1956 production over that of 1955. Table II gives total production in Argentina since discovery of oil in 1907.

Attention is called to the contribution of the private oil companies production during the full development of their oil fields. These companies, with no oil concessions since 1934 are at present drilling in depleted oil reservoirs and using all their ingenuity to reduce to a minimum the decline in their fields. One company which has made some deep tests in Comodoro Rivadavia, abandoned the project; another has had some success in water-flooding tests in Comodoro Rivadavia. The writer has been informed that Comodoro Rivadavia and Plaza Huincul unfortunately are fractured and have small producing lenses that make water flooding economically unpractical.

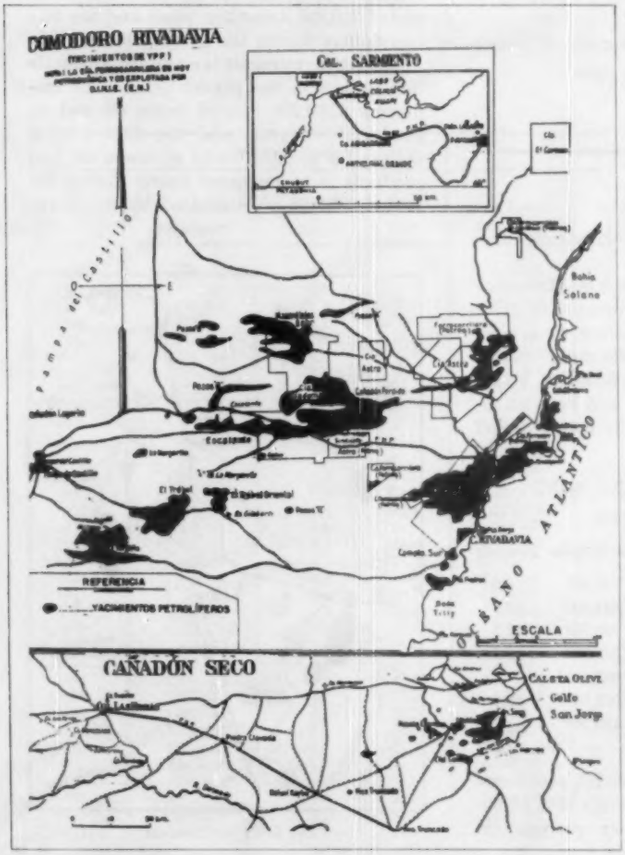
TABLE I
DRILLING IN ARGENTINA

	1955	First 8 months 1956
Exploratory wells drilled:		
Producers	19	19
Dry	36	19
Development wells drilled:		
Producers	198 (4 deepened)	114
Dry	32	27
Footage drilled:		
Exploratory	354,000	180,000
Development	1,250,000	955,000
Rigs in service:		
Exploratory	18	18
Development	49	50

Total wells drilled (cumulative to August 30, 1956)	9,320
Producing	3,385
Pumping	3,277
Flowing	108
Prod. gas	284
Abandoned	2,369
To be abandoned	1,832
Dry	1,368

Consumption of petroleum products during 1955 added up to 12,200,000 cubic meters (76.8 million barrels). Including natural gas, consumption reached a total of 11,8 million tons of oil equivalent. Based on the reported figures for the first 8 months of 1956 and its present trend, a consumption

Oil fields in Chubut, Comodoro Rivadavia region.



Oil fields in Salta.

TABLE II—ARGENTINE CRUDE PRODUCTION

(Cubic Meters)

Year	YPF (1)	Private Companies	Total	% By YPF
1907	16	—	16	100.0
1908	1,821	—	1,821	100.0
1909	2,989	—	2,989	100.0
1910	3,293	—	3,293	100.0
1911	2,082	—	2,082	100.0
1912	7,462	—	7,462	100.0
1913	20,733	—	20,733	100.0
1914	43,740	—	43,740	100.0
1915	81,580	—	81,580	100.0
1916	129,780	7,771	137,551	94.4
1917	181,621	10,667	192,288	94.5
1918	197,587	17,281	214,868	92.0
1919	188,113	23,188	211,301	89.0
1920	227,115	35,339	262,454	86.5
1921	277,726	48,180	325,906	85.2
1922	349,059	106,610	455,669	76.6
1923	415,039	123,023	538,062	77.1
1924	474,602	186,776	661,378	71.8
1925	610,475	328,029	938,504	65.0
1926	730,239	504,293	1,234,532	59.2
1927	802,082	549,089	1,351,171	59.4
1928	817,697	581,459	1,399,156	58.4
1929	871,969	620,896	1,492,365	58.4
1930	827,429	603,094	1,430,523	57.8
1931	873,591	987,821	1,861,412	46.9
1932	902,247	1,186,576	2,088,823	43.2
1933	921,804	1,254,771	2,176,575	42.4
1934	835,502	1,394,150	2,229,652	37.5
1935	943,839	1,329,131	2,272,970	41.5
1936	1,140,041	1,317,354	2,457,395	46.4
1937	1,261,773	1,338,208	2,599,981	48.5
1938	1,430,600	1,284,224	2,714,824	52.7
1939	1,625,204	1,333,964	2,959,168	54.9
1940	1,983,252	1,293,244	3,276,496	60.5
1941	2,226,798	1,272,957	3,499,755	63.6
1942	2,445,586	1,322,961	3,768,547	64.9
1943	2,632,901	1,315,511	3,948,412	66.7
1944	2,576,369	1,275,719	3,852,088	66.9
1945	2,456,894	1,180,625	3,637,519	67.5
1946	2,259,757	1,047,462	3,307,219	68.3
1947	2,425,716	1,047,551	3,473,267	69.8
1948	2,646,091	1,046,402	3,692,493	71.7
1949	2,580,097	1,011,277	3,591,374	71.9
1950	2,755,085	974,920	3,730,005	73.9
1951	2,958,271	931,338	3,889,609	76.1
1952	3,097,365	848,679	3,946,044	78.5
1953	3,710,583	820,818	4,531,401	81.9
1954	3,916,099	785,479	4,701,578	83.3
1955	4,067,000	783,000	4,850,000	83.8
1956 (9 Mos.)	3,047,000	583,000	3,630,000	

(1) Before YPF began production figures refer to financial interest.

of some 12,8 million cubic meters (217,880 barrels) of liquid derivatives is expected in 1956. Including natural gas, an increase of nearly 6% in 1956 over 1955 consumption is estimated. Forecasts made by C.E.P.A.L. (U.N. Economic Committee for Latin America), as well as estimates by other sources, bring 1960 oil consumption, including natural gas, to 16,8 million tons and that of 1965 to 24,5 million tons.

Present refining capacity amounts to 11,2 million cubic meters per year. Of this, 7,300,000 belong to YPF and 3,900,000 to private companies. Crude runs in 1955 and 1956 were a little above 80% of total capacity. YPF's reactivation plan includes an increase of 2 million cubic meters (12,8 million barrels) refining capacity per year in its refineries and new plant to be erected in the outskirts of Buenos Aires. This brings total refining capacity of the country in 1960 to 13,2 million cubic meters (82,5 million barrels) per year which, with the natural-gas production equivalent to 4 million tons of fuel oil and imports, covers total petroleum demand for that year, leaving no room for expansion of the private oil companies refineries.

Crude runs to stills were 6,000,220 cubic meters during the first 8 months of 1956; of these, 3,195,000 cubic meters were from domestic fields and 3,026,000 cubic meters were imported from Peru, Ecuador, Venezuela, Russia, Middle East, and Bolivia.

Refinery yields during the above period were as follows:

ARGENTINE REFINERY RUNS

—8 MONTHS 1956

	Cubic Meters	*Percent*
Aviation gasoline	36,500	0.5
Gasoline	1,444,800	23.2
Kerosine	750,700	12.2
Gas oil	342,300	5.5
Heavy distillate fuel	652,800	10.5
Residual fuel oil	2,373,700	38.4
Lubricants	110,100	1.8
Other	—	7.9

As may be noticed in Table III, petroleum consumption in 1955 was nearly 10% above that of 1954. The increase corresponds mainly to heavy distillates and residual fuels: 29.6% for heavy distillate fuels, 21.6% for gas oil, and 9.7% for residual fuel oil.

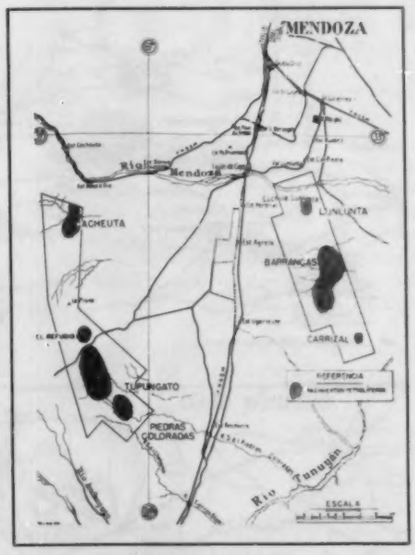
Sales of liquid fuels during 1955 were distributed as follows:

OIL SALES IN ARGENTINA (1955)

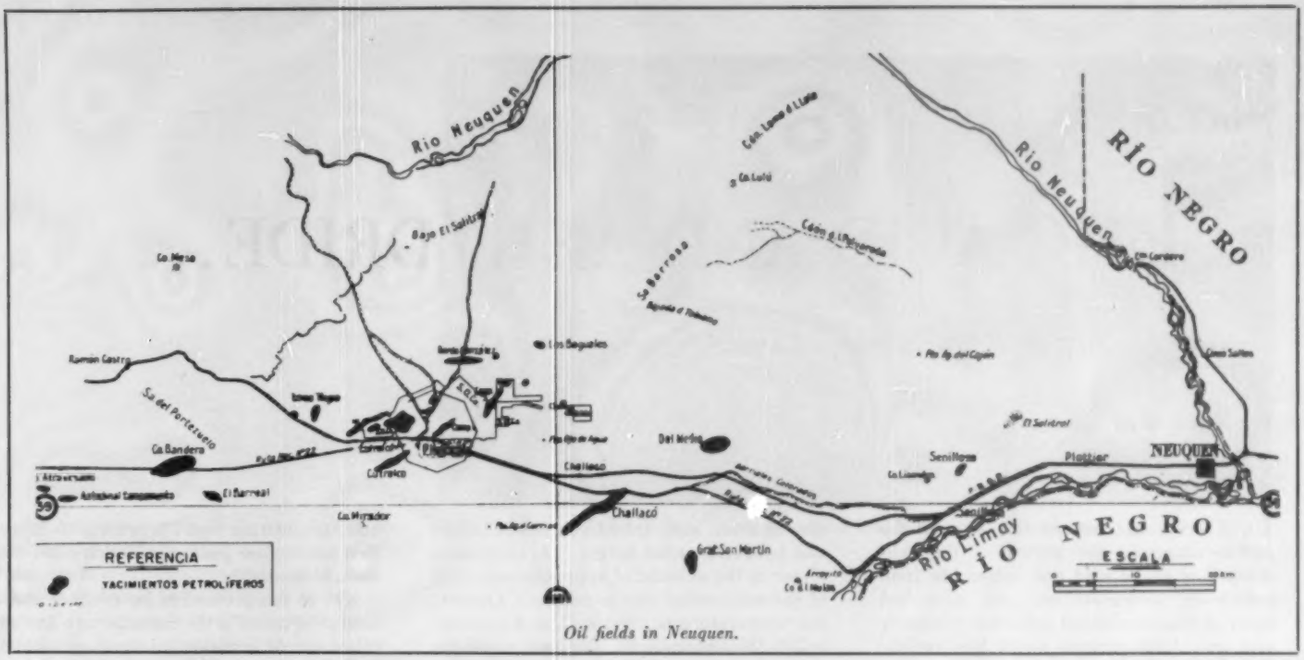
(Cubic Meters)

Company	*Yearly Sales*	*Percentage*
YPF	6,762,300	62.7
ESSO	1,471,988	13.7
Shell Argentina	1,736,999	16.1
Others	808,205	7.5
Product		
Avgas	78,960	0.7
Gasoline	2,153,800	20.0
Kerosine domestic	934,440	8.6
Tractor oil	258,750	2.4
Gas oil	905,490	8.4
Heavy fuel distillate	898,690	8.4
Residual fuel	5,550,330	51.5

As seen, YPF is the largest oil producer, refiner, and marketer of crude oil and petroleum products in Argentina. The successful completion of YPF reactivation plan and the present policy of granting no more oil concessions to private companies will make YPF's production nearly 95% of the total, and its share of the local market may reach 77% in 1960 and 85% in 1965. This increase, according to the conclusions of the Special Power Committee of the Argentine Engineering Society, will demand a cost of $7,800 million Argentina pesos and $676 million dollars during the period 1955/60, and of $10,800 Argentina pesos and one billion dollars during the period 1961/1965. In the above investments is excluded $204 million dollars in the period 1955/60 for importing 6,900,000 tons of crude oil and its products per year, and the $240 million dollars for 8,000,000 tons of crude oil and products to be imported yearly during the period 1961/65, as estimated by the above



Oil fields in Mendoza.



Oil fields in Neuquen.

Special Power Committee of Argentina.

Considering the huge investments required during the 10-year period of 28.6 billion Argentina pesos and 3.8 billion dollars; that Argentina will continue importing between 30% and 40% of its oil requirements (including natural gas as fuel equivalent); and that nearly 70% of the country's power requirements in 1965 will have to be supplied by one single company (even if owned by the State) thus eliminating competition, the most effective spur for improvement and progress, it is questioned whether it is wise to continue with the present oil policy which tends to state monopoly, or to give equal opportunities to private capital for developing the country's oil resources regulating their activities by a new up-to-date oil law as suggested by the writer in WORLD PETROLEUM, during June 1955, page 146. END

TABLE III—ARGENTINE CONSUMPTION OF OIL AND GAS DERIVATIVES

(In Metric Tons of Oil Equipment)

Year	Domestic Crude			Imports			Total			Natural Gas	
	Ton. Equiv Petroleum	Yearly Increase (%)	% of Total	Ton. Equiv Petroleum	Yearly Increase (%)	% of Total	Ton. Equiv Petroleum	Yearly Increase (%)	% of Total	Ton. Equiv Petroleum	% of Total
1922	410,102		8.0	651,048		12.8	(1) 1,061,150		20.8	49,860	1.0
1923	484,256	18.1	8.7	719,691	10.5	13.0	(1) 1,203,947	13.5	21.7	57,816	1.0
1924	595,240	22.9	9.3	731,365	1.6	11.4	(1) 1,326,605	10.2	20.7	82,950	1.3
1925	844,654	41.9	13.9	142,722	—80.5	2.4	(1) 987,376	—25.6	16.3	101,529	1.8
1926	1,111,079	31.5	16.5	626,662	339.1	9.3	(1) 1,737,741	76.0	25.8	164,676	2.4
1927	1,216,054	9.4	15.4	1,087,590	73.6	13.8	2,303,644	32.6	29.2	143,858	1.8
1928	1,259,240	3.6	15.9	1,351,294	24.2	17.0	2,610,534	13.3	32.9	163,065	2.1
1929	1,343,579	6.7	16.5	1,553,661	15.0	19.1	2,897,240	10.9	35.6	181,817	2.2
1930	1,287,471	— 4.2	16.1	1,650,994	6.3	20.6	2,938,465	1.4	36.7	192,116	2.4
1931	1,675,272	30.1	21.1	1,409,645	—14.6	17.8	3,084,917	5.0	38.9	237,730	3.0
1932	1,879,939	12.2	25.1	979,230	—30.5	13.1	2,859,169	— 7.3	38.2	241,746	3.2
1933	1,958,918	4.2	26.4	827,249	—15.5	11.2	2,786,167	— 2.6	37.6	282,261	3.8
1934	2,006,687	2.4	24.7	1,044,963	26.3	12.9	3,051,650	9.5	37.6	328,056	4.0
1935	2,045,672	1.9	24.3	1,277,173	22.2	15.1	3,322,845	8.9	39.4	358,971	4.3
1936	2,211,656	8.1	25.6	1,263,409	— 1.1	14.6	3,475,065	4.6	40.2	331,881	3.8
1937	2,339,984	5.8	24.8	1,746,537	38.2	18.5	4,086,521	17.6	43.3	361,017	3.8
1938	2,443,341	4.4	26.4	1,721,179	— 1.5	18.6	4,164,520	1.9	45.0	348,430	3.8
1939	2,663,251	9.0	27.9	1,758,980	2.2	18.4	4,422,231	6.2	46.3	357,391	3.8
1940	2,948,846	10.7	31.4	1,617,668	— 8.0	17.2	4,566,514	3.3	48.6	370,179	3.9
1941	3,149,780	6.8	30.2	1,735,271	7.3	16.6	4,885,051	7.0	46.8	395,796	3.8
1942	3,391,692	7.7	31.8	853,921	—50.8	8.0	4,245,613	—13.1	39.8	434,824	4.1
1943	3,553,571	4.8	33.3	175,050	—79.5	1.6	3,728,621	—12.2	34.9	423,579	4.0
1944	3,466,879	— 2.4	31.4	91,736	—47.6	0.8	3,558,615	— 4.6	32.2	427,351	3.9
1945	3,273,767	— 5.6	31.5	271,190	195.6	2.6	3,544,957	— 0.4	34.1	402,101	3.9
1946	2,976,497	— 9.1	27.5	2,688,810	891.5	24.8	5,665,307	59.8	52.3	375,568	3.5
1947	3,125,940	5.0	27.2	3,520,342	30.9	30.7	6,646,282	17.3	57.9	377,818	3.3
1948	3,323,244	6.3	27.3	3,884,981	10.3	31.9	7,208,225	8.5	59.2	383,430	3.1
1949	3,232,237	— 2.7	26.0	4,474,199	15.2	36.0	7,706,436	6.9	62.0	387,130	3.1
1950	3,357,005	3.9	25.7	5,120,892	14.5	39.2	8,477,897	10.0	64.9	457,037	3.5
1951	3,267,640	— 2.7	24.5	5,554,323	8.5	41.6	8,821,963	4.1	66.1	509,323	3.8
1952	3,049,888	— 6.7	22.0	6,024,807	8.5	43.4	9,074,695	2.9	65.4	551,770	4.0
1953	3,816,573	25.1	26.9	5,649,178	— 6.2	39.8	9,465,751	4.3	66.7	593,727	4.2
1954 (2)	4,125,324	8.1	21.8	6,096,191	5.7	41.1	10,217,515	6.6	68.9	605,607	4.1
1955 (a)	3,928,901		25.0	1,342,422		46.1	11,271,023		71.7	539,450	3.4

PART II

ACETIC ACID AND ANHYDRIDE...

A Case History in Petrochemical Growth

By Peter W. Sherwood

In a previous part of this report[1] the author discussed the growth of the production of acetic acid and anhydride from petroleum hydrocarbons, and described three of the commercial oxidation processes and one direct process which has not attained commercial interest.

Additional processes for consideration include the production of acetic acid from methanol and carbon monoxide. The low cost of these raw materials has provided an incentive for the direct synthesis of acetic acid from these raw materials:

$$CH_3OH + CO \rightarrow CH_3COOH \quad \ldots \quad (2)$$

Again, numerous efforts have been made for the development of an economically sound process for embodying this reaction. Early attempts involved the use of acidic catalysts (notably phosphoric acids, but also boric, arsenic, molybdic acids, etc.), often with a metallic promoter (copper, palladium.) Very high pressures (4,500-6,000 psi) and temperatures 300-450 C) are called for, and operation requires very large excess CO (mole ratios $CO:CH_3OH$ of 5 to 20). It is evident that such conditions call not only for high investment and operating costs, but also impose a severe problem of corrosiveness. According to Ullmann[7], graphite was used successfully as material of construction in the pilot-plant operation of one acetic process in this category. During the latter part of World War II it was found possible to operate at more moderate conditions by the use of carbonyl-forming metals in conjunction with iodine.

Work along this line has been taken beyond the inexpensive raw material base offered by methanol and carbon monoxide. It should be remembered that methanol itself is the product of carbon monoxide and and hydrogen and that, in its synthesis, conversion of only about 20-30% is taken per pass. As a result, the unpurified methanol reactor gas contains both methyl alcohol and carbon monoxide at high pressure, and a natural incentive is given to react these gases further to acetic acid, without intermediate purification.

Interest attaches to a process of this type developed by Thomas and Alcock[11]. The catalyst is a mixture of equal parts of glacial acetic acid, anhydrous nickel iodide, and hydrated nickel iodide (i.e., containing water in the amount of approximately 15% of the total nickel iodide present). Operating temperature is 130-190 C, and pressure is 250-350 atmospheres. The feed gas is the make from a methanol reactor in which about 20-30% conversion of the synthesis gas ($ZH_2:CO$) has been taken. Thorough stirring must be provided because there are normally two liquid phases, a solid phase and a gas phase, present in this reaction system.

The two-stage reaction system (i.e., methanol synthesis followed directly by acetic-acid synthesis) shows 30-50% per-pass conversion of carbon monoxide to acetic acid. An ultimate yield better than 80% (up to 90%) on carbon monoxide is claimed.

As yet, the synthesis method has a major drawback in that the reaction time is of the order of 1½ to 2 hours to attain the conversions cited above. This compares with 5-6 minutes required for 30% conversion in *methanol* synthesis, carried out at the same pressure over its typical catalyst (5 ZnO. Cr_2O_3).

By-product acetic acid in epoxide production—Announcement was made recently by Carbide and Carbon Chemicals Corp. of a new process in which acetic acid is formed as by-product. The method involves the oxidation of a large variety of olefinic compounds (other than ethylene) by means of peracetic acid to yield epoxides and acetic acid.

As a synthesis of epoxides, the method would compete with present routes in which hydrogen peroxide is employed as oxidizing agent. It also offers a direct means for the formation of epoxides which are today produced in two steps, via the olefin epichlorohydrin. Among products of interest are styrene oxide, 1,4-dichloro-2,3 epoxybutane, diisobutylene oxide, plus a whole family of other epoxy compounds, of interest as chemical intermediates, for resin production, as stabilizers, odorants, etc.

These compounds, which are today high-cost items, may find increased use as the new epoxidation method, bolstered by credit for by-product acetic acid, lowers their production cost. Plans for a 20-50 million pounds per year epoxidation plant have been indicated[12].

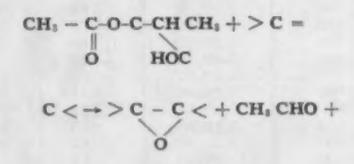
Key to this method of by-product acetic-acid production is the manufacture and stabilization of acetaldehyde monoperacetate. Starting point is acetaldehyde which may be oxidized to peracetic acid (equation 1).

The reaction may be catalyzed by certain heavy metal salts (cobalt acetate, etc.). These are, however, the same catalysts which also accelerate the decomposition of peracetic acid to acetic acid so that a satisfactory concentration of the peracid cannot be built up. Favorable to peracetic stability of low temperature. Furthermore, it has been found that acetaldehyde oxidation may be catalyzed by ultraviolet light to yield a peracetic-acid solution which is not rapidly degraded to acetic acid. Specifically, this peracetic acid appears to be present in the form of acetaldehyde monoperacetate which is stabilized by the presence of a suitable solvent such as acetic acid (acetone or ethyl acetate, among others, may also serve).

A method for the production of acetaldehyde peracetate by this means is described by Carbide and Carbon Chemicals Corp.[13]. Operation in the range —5 C to 0 C is called for. At this temperature, oxygen is passed into a mixture of three parts by volume of acetaldehyde and one part acetic acid. The system is irradiated by ultraviolet light. Adequate cooling must be provided to handle the exothermic reaction heat.

After about 3.5 hours, some 50-60% of the acetaldehyde has ben converted to acetaldehyde monoperacetate, showing a nearly quantitative ultimate yield.

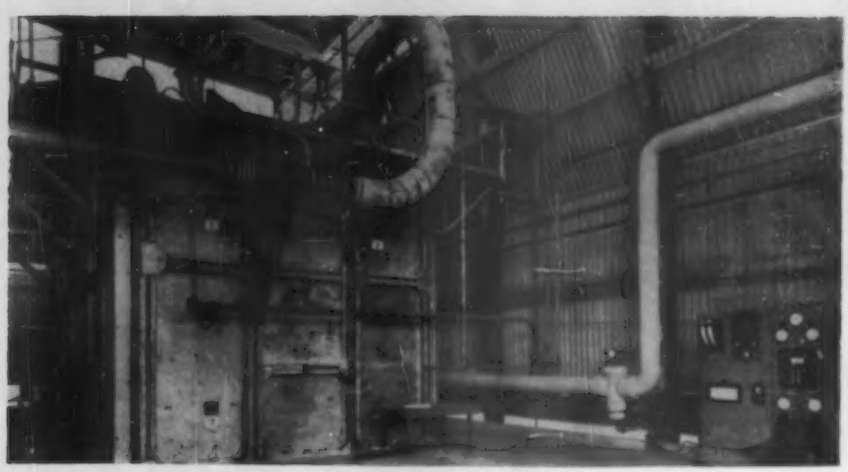
It is the epoxidation of olefins by means of acetaldehyde monoperacetate which yields acetic acid as by-product:



$$CH_3COOH \quad \ldots \quad (3)$$

This reaction is carried out in the liquid

[1]World Petroleum, November 1956, p. 92.



Acetone cracking furnace in acetic anhydride plant of Courtaulds, Ltd.

phase at approximately 70 C. No catalyst is needed; the olefin is used in excess above stoichiometric requirements. Provision must be made for the continuous overhead removal of by-product acetaldehyde as it is formed. In the case of epoxides which tend to be hydrolized by acetic acid, it is furthermore necessary to provide for overhead removal of acetic acid by operating at reduced pressure. Olefins or epoxides which have a strong polymerizing tendency must be inhibited (e.g., by a small quantity of hydroquinone).

In this epoxidation reaction, conversion on acetaldehyde peracetate is of the order of 80-95%. Yield on olefin is 90-92% of theory.

Acetic Anyhydride Processes. Four routes lead from petrochemical sources to acetic anyhydride:

1. The ethylidene diacetate process
2. Partial oxidation of acetaldehyde
3. Cracking of acetic acid
4. Cracking of acetone.

Today partial oxidation of acetaldehyde and of acetic acid are the leading methods. Economics of acetone cracking are becoming more favorable in the light of recent developments which tend to make acetone almost a surplus commodity. The ethylidene diacetate route has been losing favor in recent years, but it has been operated on a commercial scale at du Pont's Waynesboro plant, and by Shawinigan Chemicals in Canada. A related process retains importance as a source of vinyl acetate.

The Ethylidene Diacetate Route. The method involves the esterfication of acetic acid by acetylene to form ethylidene diacetate which may be decomposed to yield acetic anhydride and acetaldehyde.

$$2\,CH_3COOH + CH \equiv CH \cdots >$$

$$(CH_3\overset{\overset{O}{\parallel}}{C} - O)_2 - CH\text{-}CH_3 \cdots >$$

$$(CH_3CO)_2O + CH_3CHO \quad (4)$$

Production of ethylidene diacetate is carried out in the liquid phase at mild conditions (60-80 C, atmospheric pressure). Mercuric oxide, promoted by acids (sulfuric acid or acetyl sulfuric acid) serves as catalyst. By-product of the primary reaction is vinyl acetate, and composition of the make may be varied over wide limits, as may be called for by market conditions, by adjustment of operating temperature and extent of vinyl acetate removal as it is formed.

One drawback of the EDA process is the formation of a mercury-containing sludge by catalyst deterioration. These mercury values must be recovered by a furnace operation which is both costly and shows some loss of metal. This disadvantage is minimized by using acetyl sulfuric acid as acid promoter for the catalyst. Morrison[13] has shown that catalyst of this type has a particularly long useful life (approximately 150 to 160 pounds of product per pound of H_2O converted to sludge).

Commercial-grade glacial acetic acid and acetylene are satisfactory raw materials for the EDA process. Upon completion of the reaction, crude ethylidene diacetate is freed of mercury sludge. To destroy residual mineral acid the organic phase is treated with aqueous sodium acetate. Vacuum distillation serves for the overhead removal of contained vinyl acetate and acetic acid, and finally for the purification of ethylidene diacetate.

Decomposition of ethylidene diacetate to acetaldehyde and acetic anhydride takes place readily at 150 C in the presence of zinc chloride. The operation is carried out continuously, with the products taken overhead at a rate of feed matched to consumption. High yield is obtained—about 97% of theory anhydride and only slightly inferior recovery of acetaldehyde.

There is a gradual buildup of impurities in the reactor phase and a bleedstream, therefore, must be taken from time to time to permit undiminished progress of the reaction. In the course of such withdrawal, values are lost in the form of organic material as well as of the contained catalyst.

A typical reactor feed contains 500 parts ethylidene diacetate, one part zinc oxide, and 2.6 parts acetamide (the presence of acetimide decreases the amount of tar formation and thereby reduces the size of the bleedstream which must be taken).

After the batch has been raised to 150 C, 1.5 parts zinc chloride are added. Ethylidene diacetate makeup is provided continuously. The rate at which the catalyst and modifier must be introduced is determined by the size of the required bleedstream which, in the course of one hour, is of the order of 2-5% of the reactors liquid contents.

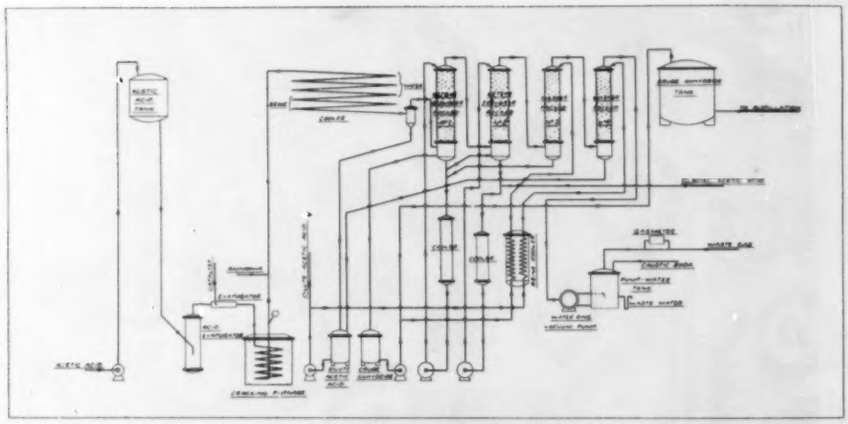
Partial Oxidation of Acetaldehyde. The partial oxidation of acetaldehyde to *acid* has been discussed above. By a modification of conditions, it becomes possible to obtain direct conversion to a mixture of acetic anhydride and acetic acid in ratios as high as 60:40, without deleterious effect on yield (but with somewhat reduced conversion rates).

The oxidation is carried out in the liquid phase with suspended catalyst consisting of cobalt acetate and copper acetate in a weight ratio of 2:1. Two commercial methods of operation have been reported.

In one of these versions, a diluent (ethyl acetate) is part of the reactor charge. It serves the primary purpose of suppressing side reactions in the oxidation stage which favor acetic-acid formation at the expense of the anhydride. Following the reaction stage, water must be removed immediatey by distillation at low temperature (to minimize hydrolysis losses). Here, ethyl acetate is of further assistance as azeotroping agent.

The second industrial version effects oxidation in the absence of a diluent. A less favorable ratio of anhydride to acid is obtained in the product of this process. The draw back is largely offset by the higher oxidation rates which are possible at these operating conditions.

For *oxidation in the presence of a diluent*, the charge consists of a solution of acetalde-



Flow scheme for the production of acetic anhydride from acetic acid.

hyde in twice its volume of ethyl acetate, and contains 1% by weight of catalyst (2 parts cobalt acetate to 1 part copper acetate). The reaction is carried out at 50 C and at 30 psig.

To maintain contol over the progress of the highly exothermic reaction, adequate cooling surface must be provided, and oxygen is injected at various points along the path of liquid travel. Nitrogen is injected with the feed as carrier gas. All surfaces in contact with the reaction phase are made of aluminum. Overall oxygen supply is controlled at about 1-2% in excess of stoichiometric requirements.

Per-pass conversion is almost complete, and only some 2-4% of the acetaldehyde charge appears in the crude oxidation product leaving the top of the reactor. Acetic anhydride and acid are present in a ratio approximating 55:45. Most of the balance is ethyl acetate and water, plus some ethylidene diacetate.

Crude oxidation product passes directly to the first stage of the fractionation system, where ethyl acetate serves as entraining agent for contained water. The overhead consists of two layers. The aqueous phase is withdrawn and accumulated for eventual recovery of contained aldehydes and esters. The ester layer is partly refluxed, and the balance is taken to a drying column.

A vacuum topping operation serves to separate acetic anhydride and acid from catalyst mud and ethylidene diacetate contained in the bottoms of the primary column.. A third column, operated at 100-200 mm Hg serves for purification of acetic acid, and product acetic anhydride is taken overhead in a fourth column (run at 30-50 mm Hg.)

In this process, the production of 1,000 pounds 95% acetic anhydride consumes 1,680 pounds acetaldehyde, 3 pounds ethyl acetate, and 2 pounds catalyst. 1,050 pound acetic acid becomes available as co-product[14].

Diluent-free oxidation of acetaldehyde permits higher throughput per unit reactor space, but leads to a less favorable anhydride to acid ratio. Here, a typical charge consists of 1,600 pounds acetaldehyde, 20 pounds cobalt acetate, 10 pounds copper acetate, 270 pounds acetate acid-anhydride mixture. Oxygen is used as oxidizing agent. Operating temperature is 50-55 C; pressure is about 35 psig.

On a catalyst-free basis, the crude oxidation product contains 35-40% acetic anhydride, 8-19% water, 0.5-1.0% acetaldehyde, 0.5% methyl acetate, 49-55% acetic acid.

Water removal is effected by vacuum distillation at 30 mm Hg. abs., with a bottoms temperature of 60%. The overhead contains 15% water, 80% acetic acid, plus unconverted acetaldehyde and some esters. The bottoms are worked up in a manner substantially similar to the product obtained by oxidation of acetaldehyde in the presence of ethyl acetate.

Acetic Anhydride by Acetic Acid Cracking. This route to acetic anhydride is carried out in two steps: Dehydration of acetic acid to ketene, followed by reaction of ketene with another mole of acetic acid:

$$CH_3COOH \xrightarrow{-H_2O} CH_2=C=O$$

$$CH_2=C=O + CH_3COOH \longrightarrow (CH_3CO)_2O \quad (5)$$

The first (cracking) stage is carried out in the vapor phase, using triethyl phosphate as catalyst. The reactor make is absorbed in liquid acetic acid to effect the method's second conversion.

In one typical commercial plant, the production of 1,000 pounds of acetic anhydride calls for a total acid feed of 1,330 pounds. Of this, 52-53% is charged to the evaporator of the cracking section, whereas the balance serves as feed to the absorbers. Since, in the process, some 90-95 pounds of acetic acid becomes available in weak (35-38%) recoverable form, net consumption is about 1,240 pounds per thousand pounds of anhydride. This is a yield of nearly 95% of theory.

Furnace acid is evaporated. En route to the cracker, it is mixed with 0.20-0.30% by weight of vaporized triethyl phosphate. The mixture is then fed to the cracking coils which are operated at approximately 740 C, and an outlet pressure of 120-160 mm Hg.

Reactor gas, rich in ketene, is stabilized (against reversion to acetic acid) by injection of about one pound ammonia per 4.2 pounds of triethyl phosphate. It is cooled to 0 C. Condensate formed during this step is separated in a knockout pot and withdrawn as 35-38% acetic acid.

The gas-stream passes through a sequence of two absorption towers. In the first of these, crude (89-93%) anhydride which is formed as ketene is absorbed in a solution of 15-35% anhydride in acetic acid. Residual ketene passes to the second absorber where it is contacted with glacial acetic acid to yield the liquid feed to absorber No. 1. Effluent gases are scrubbed for recovery of residual acetic values.

The crude anhydride is fractionated to a purity of 98-99%.

Acetic Anhydride from Acetone. Ketene, intermediate in acetic anhydride production from acetic acid, may also be obtained in industrially attractive yield by the thermal decomposition of acetone:

$$CH_3-\overset{O}{\overset{\|}{C}}-CH_3 \longrightarrow CH_4+CH_2=C=O \quad (6)$$

The cracking reaction is carried out between 700 and 850 C. A small amount of carbon disulfide must be added to the feed to overcome an otherwise troublesome extent of carbon formation.

The conversion taken per pass influences the yield critically. Thus, at 10% conversion, 86% yield of ketene is possible, but only 70% yield is attained at 25% conversion. The depth of cracking must be set by economic compromise between required throughput and raw materials consumption. It is controlled by adjustment of contact time, 25-75 second to the operating temperature.

The hot product gases must be shock-cooled by injection of a recycle fraction, rich in acetic acid, which is obtained from the purification section. The gas phase, taken overhead from the quench tower at 150 C must be cooled and scrubbed for further recovery of acetic values.

The main (liquid) product stream is freed of acetone in a primary distillation step. The bottoms serve, in part, as feed to the quench tower. A side-stream is continuously taken to an acetic-acid tower. The acid, taken overhead, is recycled to the process. The bottoms, which consist primarily of acetic anhydride, are fractionated for purification of the plant product. END

BIBLIOGRAPHY

(See Part I, World Petroleum November 1956, page 95, for balance of literature references.)

11. Thomas, E. B. and Alcock, E. H., U. S. 2,650,245 to British Celanese, Ltd. (Aug. 25, 1953)

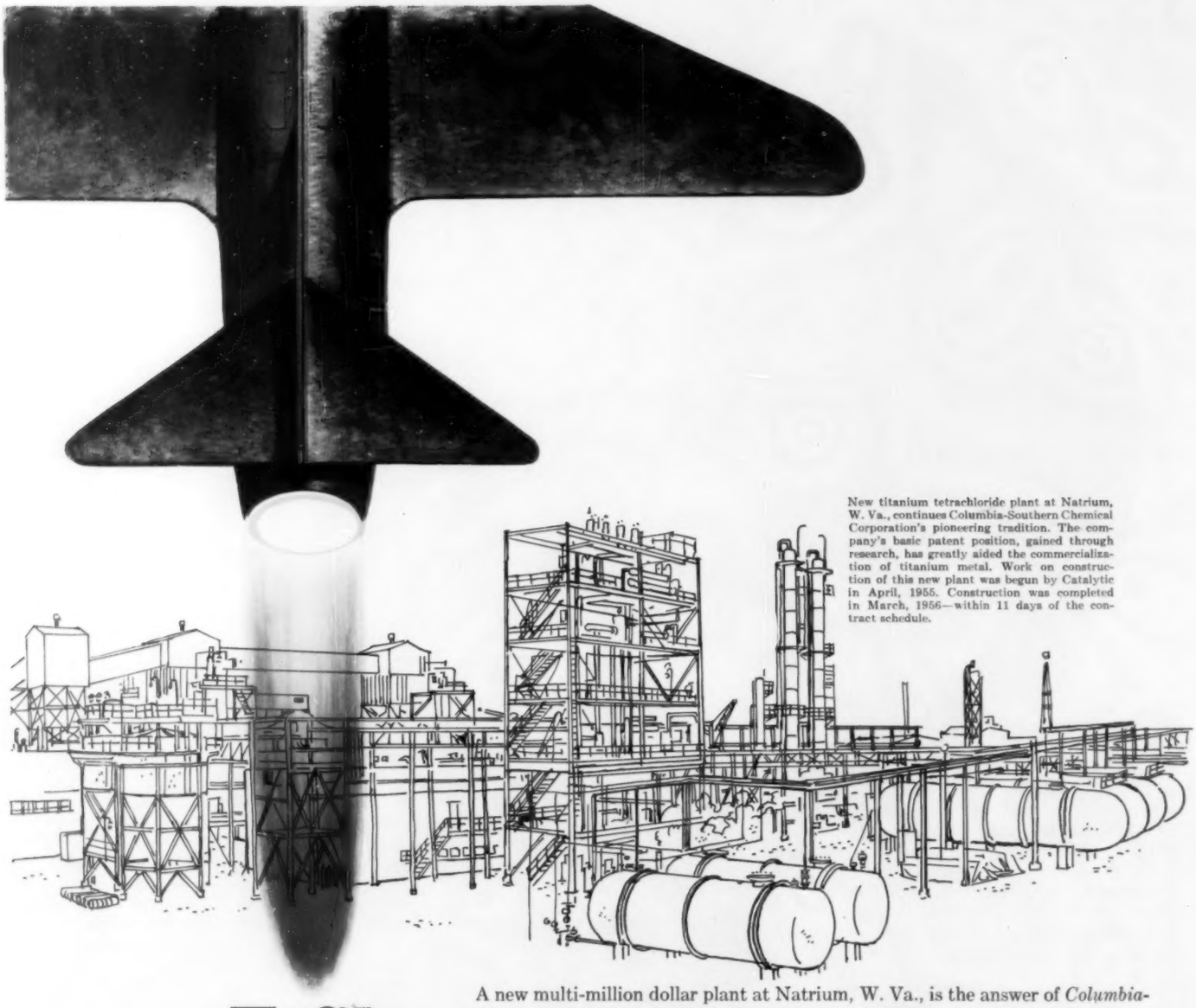
12. Chemical Week. April 14, 1956, pages 92-94

13. Morrison, G. W. and Shaw, T. P. G. Trans Electrochem. Soc. 63,425 (1933)

14. Sherwood, P. W. Pet. Eng. Aug. 1954 page C-31

15. Brit. 735,975 to Carbide and Carbon Chemicals Corp. Aug. 21, 1955

Season's Greetings from SCHLUMBERGER



New titanium tetrachloride plant at Natrium, W. Va., continues Columbia-Southern Chemical Corporation's pioneering tradition. The company's basic patent position, gained through research, has greatly aided the commercialization of titanium metal. Work on construction of this new plant was begun by Catalytic in April, 1955. Construction was completed in March, 1956—within 11 days of the contract schedule.

$TiCl_4$

(Titanium tetrachloride)

A new multi-million dollar plant at Natrium, W. Va., is the answer of *Columbia-Southern Chemical Corporation* to the task of producing $TiCl_4$—titanium tetrachloride—which in turn is used in production of titanium.

Titanium is metallurgy's answer to the need for metal resistant to high temperatures—as in supersonic aircraft.

Titanium tetrachloride—the product of this new plant engineered and constructed by Catalytic—has opened up important markets in diversified other fields as well as in production of titanium sponge. Its many uses include the manufacture of catalysts for plastics, the making of titanium esters, and service as a reducing agent for dyes.

CATALYTIC

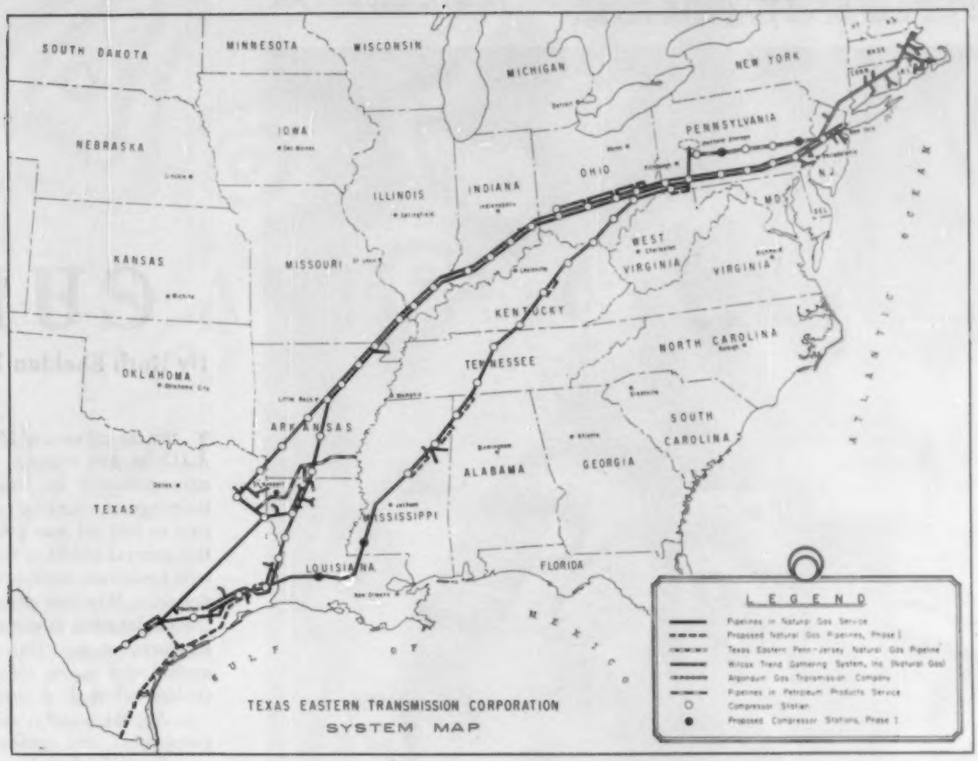
Construction Company

Philadelphia 2, Pennsylvania
Toledo, Ohio

In Canada: Catalytic Construction of Canada, Limited; Sarnia, Ontario; Toronto, Ontario; Montreal, Quebec

Catalytic *On-Time*... *On-Budget* Services

for the metallurgical, chemical, petrochemical and oil refining industries: Project Analysis; Process Development; Process Design; Economic Studies; Engineering; Procurement; Construction; Plant Operation



MEXICAN GAS IMPORTS APPROVED

A NEW and major commercial link between the United States and Mexico was forced by the U.S. Federal Power Commission when the commission flashed the go ahead October 9 for Texas Eastern Transmission Corp., Shreveport, La., to bring in a large volume of natural gas from Mexico.

The importation, said the commission, will be "consistent with the public interest." The right of Petroleos Mexicanos to sell and export the gas was established during hearings, with testimony of Eduardo Suarez, for eight years vice president of the board of Pemex.

The commission stated "We view the importation as proposed as indicative of mutual benefit which our country and its neighbor to the South may receive by commercial relations and as illustrative of the mutual faith, confidence and respect each has for the other.

"We must dismiss as unfounded the fears of the City of Pittsburgh that the contract will be rendered null and void by action of the government of Mexico. We accept the action of its duly constituted agency as we would except similar action on the part of a duly constituted agency or representative of our government to be accepted."

The revenues which will go to Mexico, the commission said, "will permit acceleration of additional exploration for gas and petroleum in Mexico."

Texas Eastern thus received Federal Power Commission authorization today for an $82,700,000 expansion project involving the importation of natural gas from Mexico, and the commission set October 29 as the date for hearings to begin on the second phase of Texas Eastern's expansion and diversification program which relates reconversion of a major segment of the Little Big Inch line to petroleum products service. Including the second phase, which will cost about $64 million, this program will cost approximately $147 million.

Completion of the phase authorized today will increase capacity of the company's natural-gas transmission system by approximately 250,000 mcf. Mexican gas will be available at the rate of 115 million cubic feet per day initially, with the contract providing for this volume to be increased up to 200 million cubic feet per day as additional reserves in the fields covered by the contract are developed. Additional supplies of gas have been purchased along the route of a new 30-inch line which will extend from Beaumont to McAllen, Texas, on the Rio Grande and connect Texas Eastern's 5,700 mile pipe-line network with a line being built by Mexican authorities to the international border.

Construction will start immediately on approximately 422 miles of 30-inch pipe line extending from McAllen, Texas, to Texas Eastern's Vidor, Texas, compressor station; approximately 45 miles of 24-inch pipe connecting Texas Eastern's existing line near Provident City, Texas, to the new line; pipe-line loops totaling about 77 miles at various locations along the existing 30-inch system; approximately 147 miles of supply and sales laterals; new and additional compression facilities totaling 32,250 horsepower; and approximately 20 sales measuring and regulating stations. The project should be completed by the fall of 1957.

At the same time the FPC granted authorization to Texas Eastern Penn-Jersey Transmission Corp., a wholly owned subsidiary of Texas Eastern, for the construction and lease to the parent company of new and additional compression facilities totaling approximately 33,300 horsepower.

The hearings scheduled to start on October 29 will relate to the company's proposal to remove a 1,168-mile segment of the Little Big Inch line from natural-gas service so that it may be converted to a common carrier of petroleum products. Prior to removal, Texas Eastern would construct additional facilities so that natural-gas service could be maintained at current levels without the Little Big Inch line. The company proposes to offer petroleum-products common-carrier service along the route of the Little Big Inch between Beaumont, Texas, and Moundsville, W. Va., and to build lateral lines to some other points. END

Stanolind's first exploration step is aerial photography of most of the island. Greatest handicap to this P-38, which photographs from 30,000 feet, was finding perfect, clear days.

CUBAN

By Ruth Sheldon Knowles

LIKE the citizens of Monaco, the citizens of Cuba are eagerly anticipating a birth announcement in 1957. Since the recent marriage of scientific exploration to the desire to find oil was consummated in Cuba, the general public and the prospective parents have even been hoping for a premature delivery. Whether premature or full-term, the exploration doctors have only the most encouraging bulletins about the expected arrival of a major oil discovery. Their optimism is based on these facts:

1. Approximately $4,000,000 worth of geophysical and geological work has been completed the first 10 months of 1956 by the seven most active companies; $2,000,000 of this has been done by Stanolind Oil & Gas Co.; of the total $4,000,000, 95% is basic preliminary exploration to develop drillable prospects for drilling programs in 1957.

2. The exploration work is delineating all types and sizes of structures both on- and offshore.

3. High gravity oil has been found at a depth of 7,137 feet in the Central Basin, with the possibilities of developing a new field by additional drilling.

4. A shallow serpentine discovery near Havana has been producing 590 b/d, indicating the possibility of finding a major sedimentary reservoir in the area.

5. Twenty-six important exploration wells in non-serpentine areas have been drilled this year from one end of the island to the other. Twelve of them have ranged from 6,000 to 10,500 feet, with the rest averaging 3,000 feet. These tests have provided vital stratigraphic information, proved a new Tertiary basin, revealed sections of good reservoir rock, discovered a possible salt dome; and there have been innumerable oil and gas shows.

6. Currently, eight geophysical crews are working both land and water, and five surface geological parties are in the field. There are 33 geologists, five paleontologists, and 12 geophysicists dedicating full time to Cuban exploration.

7. The number of companies actively at work continues to increase. This year Jersey Standard and Union joined the list of majors which already had been comprised of Stanolind, Gulf, Standard of California, Atlantic, and Shell. Superior entered by way of a stock purchase in an independent.

HOPES ARE HIGH IN 1957

The Texas Co. is reported negotiating a large exploration contract. A half dozen independents formed new Cuba companies, making the independents' efforts in Cuba greater than in any other foreign country.

"The framework has been laid for the finding of oil," comments Mrs. Dollie Radler Hall, independent geologist of Tulsa, Okla., and one of the outstanding experts on Cuba, in a recent geological report for Cuban Venezuelan Oil Voting Trust, whose 24 companies' concession rights cover 17 million acres, on- and offshore, including the large "farmouts" to Stanolind, Cuban American Drilling & Exploration Co., and Trans-Cuba Oil Co. "Each group is attacking the problem in the manner that has led to the discovery of large oil fields in other parts of the world.

"Stratigraphic sections measured on the surface as well as those found by drilling, proves the presence of three large Tertiary Basins, containing marine sediments, that may well extend into the offshore area. This Tertiary section and the known Cretaceous and Jurassic marine section of more than 20,000 feet contain source rocks, cap rocks and reservoir rocks that should yield oil."

Mrs. Hall goes to the heart of the problem in her comment on how the oil seekers are now attacking the problem of fulfilling Cuba's great promise of large oil fields. If oil had been easy to find in Cuba, it would long since have taken its place as a major producing country, as Cuba's first oil was discovered shortly after America's Drake well. The riddle of where Cuban oil is can only be solved quickly by imaginative, creative oil thinking applied to the results obtained by the best of today's mechanical aids to oil finding.

A great and true cliché of oil exploration is: "Oil is found only by drilling." The believers in and promoters of Cuba's oil possibilities have staunchly maintained that the only reason Cuba's oil has not been found is because not enough wells have been drilled. They were, and still are, correct. But the past two years of drilling exploration in Cuba have pointed up dramatically Mrs. Hall's observation. It is not only drilling which is needed, but drilling must be preceded by a certain scientific "manner" of attacking the problem.

When the lucky discovery of Cuba's first sedimentary production in the Jatibonico field occurred two years ago, Cuba was drilling hungry. Most of Cuba's desirable areas were already under concession, and the holders of both large and small concession areas would only consider making deals carrying immediate drilling obligations on the hopeful theory that lightning always strikes twice. The oil business being what it is, the new moths attracted to the

Jim West (foreground) and Quinn Williams, party chief of Western Geophysical seismograph crew, check seismic record on prospect near Guantanamo City.

Stanolind geologist Dick Deland and surveyor, Robespier Ferrer, take rock sample of outcrop near rugged coast.

flame weren't hard to convince. Consequently, a hearty round of enthusiastic needle-in-the-haystack exploration drilling has ensued. Of course, it is possible to find a needle in a haystack as an enterprising publicity seeker once demonstrated literally and successfully at Times Square. But it takes time and patience as the same publicity seeker also proved. That's the principal reason why Cuba's arbitrary wildcatting has produced no new fields so far.

As a matter of fact, all the helter-skelter, impatient drilling has been invaluable—and the "dry-and-abandoneds" have correctly ended up in reports to the stockholders as "necessary stratigraphic tests." In nature the living always feed on the dead, and in the oil business new oil fields are found by dry holes. An executive of one oil company which has drilled more feet of dry hole than any other company in Cuba in the past two years states, "I am now more enthusiastic about finding oil than when we first started."

The most perfect "manner" in which Cuban exploration is being approached is that used by Stanolind Oil & Gas Co. A year ago, when Stanolind negotiated a half-interest farmout from CVOVT and Trans-Cuba in 12 million acres, it based its $10,000,000 commitment on Stanolind's option to earn its interest by either spending a minimum of $2,000,000 a year in exploration or drilling 40,000 feet of hole. With the hot breath of forced drilling removed from the back of its neck, Stanolind has systematically and vigorously gone about the staggering task of evaluating 12 million acres as quickly as possible. It is hard enough for oil men—and by the same token impossible for laymen—to realize just how much this entails.

Only a party of geologists or geophysicists who have tramped across sugar-cane fields, jeeped over unroaded, mountainous country, fought through swamps, and boated for days and months on calm or turbulent offshore waters can wearily attempt to convey an impression of just how vast an amount of territory 12 million acres is. And even those who have been trying it can't, because in a year's time they have only done part of the job themselves.

It is so easy in an exploration committee meeting to order an aerial photography survey to be made of the same 12 million acres, and it is even easier to read in print that it has been done. P-38's streaking over Cuba at 30,000 feet take the kind of photographs which even show up a golf ball on a fairway. What could be simpler? Except that you have to have perfect, clear weather, and that only happens an average of four days a month even in Cuba (for photographic planes, not tourists, as the Cuban Tourist Commission would wish *World Petroleum* to hasten to clarify). Then you may wait a month, and suddenly there is the one perfect day when you could fly the island end to end, only to find your camera is on the bum, as did indeed happen. No wonder, a year later, the last of the aerial mosaics are just getting into the hands of those who need them most to do the exploration planning.

In the meantime, an aerial magnetometer has been fishing the airwaves, netting vibrations to get a picture of how deeply or shallowly the basement rocks may be buried under the feet of the grounded geologists' painstakingly trying to follow surface clues in central, north-central, and eastern Cuba. Page after page of mathematical computations to be added to and correlated with the stacks of figures already yielded by the shooters of dynamite on land and in the waters off the Zapata peninsula, southern Camaguey, and the Gulf of Guacanayabo. Hundreds of men working at desks. It's all a familiar story to everyone in the business of big oil exploration, and yet it is one which even the oldest hand never really grasps in its entirety at any one moment. There's always an urgent committee meeting to interrupt just when you begin to get the feel of it.

Yet, miraculously enough, it's all coordinated and out of the committee meetings come prospects recommended for drilling. The aerial photography, aerial magnetometer, the work of the surface gelogical parties, the land and water seismograph crews all assembled even while new work is still going on. The drilling program must be scheduled even before all the exploration work has been finished. For there is an urgency to find oil; there is a saturation point in preliminary exploration, a point where the geophysical data are confusing or meaningless unless wells are drilled to prove or disprove a theory.

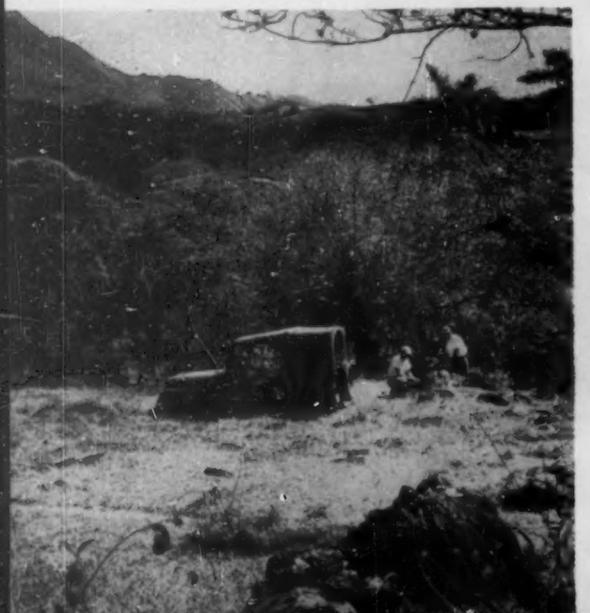
This is the "manner" of scientific exploration. Even so, the exploration men know that the first attempts are as likely to be as dry as those of the needle-in-the-haystackers. But each foot of hole drilled will release a chain reaction of knowledgeable interpretation and reinterpretation of data to guide the oil seekers more quickly to their goal.

Stanolind has not yet announced its drilling program, but indications are a test well will be drilled in early 1957, probably on land in eastern Cuba, Oriente Province. Although there will be relatively shallow areas which will merit testing, the general belief is that wells of 12,000 feet depth and deeper will be required to test the major objectives in the Cretaceous. However, the discovery of thousands of feet of asphalt-saturated reef limestone on the surface in eastern Cuba makes Tertiary oil fields a possibility.

Confirmation of the encouraging results already yielded by preliminary exploration is Stanolind's recent deal with White Eagle International to obtain an additional million acres, joining the CVOVT-Trans-Cuba farmout.

Other companies are applying the scientific manner of exploration. Cuban American has kept seismograph crews busy all year on its 750,000-acre farmout from CVOVT-Trans-Cuba in the Central Basin. Trans-Cuba has done seismograph work on part of its 3,000,000 acres, under a partnership agreement with CVOVT, in the Cauto basin in eastern Cuba. Siboney-Caribbean has spent approximately $300,000 in geophysical and geological work on its 4,000,-

Surface party Santiago de Cuba, Oriente Province, inspect outcrop in Puerto Boniato Mountains, which dip sharply toward south coast.



Stanolind geologist Dick Deland examines rock sample from Camino Real de la Isla, Cuba's first road from Santiago to Havana.

Land seismic crew working in grassy plains country, near Guantanamo City, eastern Cuba, where Stanolind may drill first well.

000 acres, with the greatest concentration of effort on its central Cuba block. Standard of California has a land and water crew accumulating data on its some 2,000,000-acre holdings which lie principally off Cuba's north coast. Atlantic has three geophysical crews working on its some 2,000,000 acres which are chiefly in Pinar del Rio Province, western Cuba. Jersey Standard has been doing gravity work on its 750,000-acre farmout from Cuban Canadian Oil Co. (American LeDuc), and has a large geological staff evaluating information concerning the whole island.

There is not a province in Cuba which is not being explored in a preliminary way. Each company is devoted to its own choice of geological play as every mother is to her own child. There is probably more diversity of geological thinking in Cuba than in any other country. All the numbers on Cuba's petroleum roulette wheel are covered and, no matter which bet pays off, the house will be the happy winner.

Of all 1956's exploration drilling, greatest interest centered on Cuban American's 7,137-foot Upper Cretaceous limestone test, Catalina No. 1, two miles south of the Jatibonico field. A drill-stem test indicated the well would be an 800 to 1,000 b/d producer of 32.9 gravity oil, and excitement ran high. However, when pipe had been set and the well completed, the best the well could be persuaded to do was between 25 and 50 b/d by heads. Not even Cuban American management has been able to satisfy itself as to what happened or why. Majority opinion is that it is a question of porosity and instead of attempting to "frac" the well, current plans are to drill another test on the structure. The next test will be a joint project of Cuban American, Trans-Cuba, and CVOVT, as Cuban American drilled seven test wells in 1956 to complete its 45,000 foot drilling obligation to earn a half interest in a 750,000-acre farmout from Trans-Cuba and CVOVT.

In the meantime Cuban Canadian Oil Co. (American Leduc) drilled a 9,200-foot offset to Catalina No. 1, 2,100 feet north. In mid-October pipe had been set and testing of several promising horizons begun.

Water seismograph shooting boat sets off shot in Gulf of Guacanayabo, which may be site of Cuba's first southern offshore test.

Shortly after dawn, recording boat (foreground) commences shooting boat at rear, and smaller liaison boat moves out from Manzanillo, in Stanolind's offshore seismic program.

Whether or not a new commercial oil field is developed in this immediate area, geologists are elated by the discovery of high-gravity oil at depth in the Central Basin. The Jatibonico oil field, discovered two years ago, is currently producing around 1,200 b/d of 14-gravity oil from some 25 wells at an average depth of 2,000 feet. The Catalina find is convincing proof that the oil seekers are on the right trail in the Central basin, and should soon make a significant discovery.

Of equal interest is Cuba's largest production well, a May serpentine discovery just east of the city of Havana in the Bacuranao oil-field area, which is currently producing 590 b/d of 28-gravity oil from 1,180 feet. It is owned by Consolidated Cuban Oil Co., a new independent company with approximately a half million acres of concessions scattered throughout the island. Until the Jatibonico discovery, all of Cuba's production has come from small wells in the serpentine, which is not a source rock for oil. The unusually high production of this new serpentine discovery, which shows no sign of declining and which actually has increased since its discovery, may be due to the "well having found a fracture system which has higher porosity and permeability and still has a direct connection with a large reservoir of oil below," according to Harry Wassall, Havana consulting geologist formerly with Cuban Gulf Oil Co.

If this is the case, a new flurry of drilling can be expected in Cuba's serpentine areas —the Bacuranao, Motembo, and Jarahueca oil fields in search of sedimentary source reservoirs.

Another area of new interest is northern Camaguey Province, where Cuban Kewanee Oil Co. and Dr. Antonio Iglesias, of Havana, drilled two deep tests on an Atlantic farmout, discovering a possible salt dome. A 10,500-foot test encountered salt at 6,200 feet, with a predominance of salt to the bottom of the hole. A 5,483-foot test to the north, also encountered salt, but for only part of the section. Whether this is a true dome or interbedded salt deposit will continue to be a subject of controversy until additional exploration is done.

Cuban Kewanee is one of the most active explorers in Cuba, having drilled two deep tests in the Jarahueca area, four tests ranging from 3,500 to 7,480 feet on a Gulf farmout south of Jarahueca, and five wells in the Santa Maria oil field east of Havana. Kewanee is currently concentrating on drilling in the serpentine areas around Santa Maria, where it has developed 170 b/d production.

Oriente Province, extreme eastern Cuba, is in the limelight with Cavalier Petroleum Co.'s wildcat near Santiago de Cuba drilling below 3,500 feet in Tertiary volcanics in mid-October. Cavalier, jointly owned by Benedum-Trees, and Russell Cobb, Jr., of Tulsa, plans a 6,500-foot test on its selection of a surface anticline. This is in the general area where Stanolind may drill its first test.

There may be additional drilling in Oriente's Cauto basin before the end of the year, as Mountain Valley Oil Co., of Denver, Colo. recently signed a farmout contract with Trans-Cuba and CVOVT with a drilling commitment of 10,000 feet of hole on each of two 80,000-acre blocks. Earlier in the year Trans-Cuba proved the presence of a thick marine Tertiary section in the Cauto basin by drilling an 8,494-foot test and a 6,853-foot test.

Although you can elicit as many different opinions as there may be geologists present in a discussion of just where or when Cuba's first major discovery will be, there is one point upon which all the participants are agreed. All the geological, geophysical, and drilling exploration of the past year has proved that Cuba has all the necessary requirements to qualify as the habitat of large oil fields. If they aren't there, then Cuba is a refugee from natural law. END

PETROBRAS EXPANDS IN 1956

By R. C. Walker

The Cubatao-San Paulo pipe line in Brazil. Photo taken by Jose M. Da Cruz and published through courtesy of Brazilian Trade Bureau.

GEOLOGICAL studies to date reveal the existence of ten sedimentary basins in Brazil, covering an area of 1,351,000 square miles, or 41% of national territory. Of the total, 579,000 square miles lie within the Amazon basin.

Geological and geophysical work was proceeding in six basins early in 1956, viz., in the Amazon, Maranham-Piaui, Rio Grande do Norte, Alagoas-Sergipe, Bahia, and Parana. By September operations had been extended to other parts of Alagoas and Parana, to Sao Paulo, Sta. Catarina, and Rio do Sul. A seismograph team had also started working offshore on the east coast, beginning with All Saints Bay, Bahia.

In August, taking advantage of the dry season, when the rivers are low, five geological teams left Belem for the remote interior of Amazonas to study the sedimentary rocks and mark new structures for future drilling. The plan to remain four months in the areas adjoining the rivers Uatuma, Maues, Purus, Trombetes, and Curua do Sul.

During the first nine months of 1956 the number of teams operating (geological, seismograph, and gravimetric) was raised to 32 from 19, and five more were about to start exploration work in other areas of the South and West Center. Research will cover the southwestern region of Sao Paulo, the eastern part of Mato Grosso and South Brazil, covering the Parana and Uruguayan basins.

At the end of the year the Petrobras staffs were assisted by 45 foreign technicians, working under the direction of Walter Link, and by specialized companies working under contract. Among these are Geophysical Service, Inc., Seismograph Service Corp., Askania Werke, United Geophysical Co., and Drilling & Exploration Co.

The sum of 649 million cruzeiros (about $97 million at the free rate) is being spent exclusively on geological and geophysical work in 1956. The cost per month in Brazil is estimated at 82,000 cruzeiros per geological, 804,000 per seismograph, and 480,000 per gravimetric team.

Colonel Janary Nuñes, president of Petrobras, says he has now ample funds to import all the equipment needed and engage as many foreign technicians as he requires. The company's capital of 8,000 million cruzeiros has been fully paid up, and is to be raised progressively to 20,000 million by 1960.

Drilling—Exploration was proceeding early in 1956 with 13 rigs. Seven wildcats were drilling, viz., at Nova Olinda (No. 2-AZ), River Abacaxis (RX1-AZ), Testa Branca, Maranham (TB1-MA), Grossos, Rio Grande do Norte (G1-RN), and in the Bahia Reconcavo (three). Rigs were about to be erected in Nova Olinda, Maranham, and Parana; one was in transit to the Cupari River; and two were undergoing repairs.

By September 27 rigs were operating and 14 others were due to arrive during the next three months. The number of wildcats drilling in the Amazon had been raised from two to seven, and the following depths (in feet) were reached by October 8: NO2-AZ, 7,686; NO3-AZ, on Marica Island, 5,564; RX1-AZ, 8,723; CPST1-PA, at the junction of the Cupari and Tapajos Rivers, 5,232; TR1-AZ, 1,430, on Trinidade Island, at the confluence of the Madeira and Amazon Rivers, 84 miles east of Manaus.

Preparations were then under way to drill VX1-AZ at the junction of the Abacaxis and Parana de Uraria Rivers, in the State of Amazonas. At least six other wells (three stratigraphic and three wildcats) will be started in the Amazon basin this year.

The following wlidcats were drilling in other areas in September, and had reached the following depths (in feet) on the 26th:

In Maranhqm, TB1-MA (Testa Branca), 6,084; MO1-MA (Mocambo), 9,409. The former had gas and oil shows at 5,408; the latter gas only at 9,301.

Rio Grande do Norte, MC1-RN (Macau), 1,427. G1-RN (Grossos) was abandoned when crystalline rock was reached at 3,299.

Bahia, Southern Reconcavo, JA1-BA (Jacuipe), a new exploration area, 9,295.

Parana, CA1-PR (Candido de Abreu), 8,417. The Jacarezinho well was abandoned at 8,100.

"Oil Well 76" drills, for 15,000 feet, are employed at TRI-AZ, NO2-AZ, NO3-AZ, RX1-AZ, NC1-RN, and MO1-MA.

The first signs of oil in the Maranham basin were found at Testa Branca, 37 miles from Riachao, where an earlier well had proved dry. MO1-MA, between Pinheiro and Sta. Helena, is being enlarged and lined, and drilling is expected to continue to 13,000 feet. Structures are marked for future drilling at Queimadas, Bequimao, and Guimaraes, in northeast Maranham.

Sixteen offshore wells, all producers, have been drilled in All Saints Bay, Bahia, an extension of the Dom Joao field, at distances up to 4.8 miles from the mouth of the river. One yielded 200 barrels on 8-hour test; another, 250 b/d at 975 feet. Sixteen other locations have been marked for drilling in the bay. On completion of the work there the team will continue operations off the northeast coast.

Bahia received five new rigs in September, one for 12,000 and the others for 5,200 feet. Of 23 wells completed in the Reconcavo in the first half of 1956, nineteen are producing oil and four are dry; eight others are now drilling, and eight are being prepared for drilling. The footage drilled in this area between January and June totaled 119,350 feet: wildcats, 30,927; development wells, 88,423.

In October drilling was started at Fernao Velho, in Alagoas, and preparations were made for a series of stratigraphic tests in Parana, at Rio Claro in Sao Paulo, Sta. Catarina, and Rio Grande do Sul.

A blowout occurred at AG25, in the Catu field, on October 3, the well remaining out of control until the arrival of Paul Adair, of the M. M. Kinley Oil Well Fighters, who was telephoned for two days later. The high column of oil, combined with a strong emanation of gas, threatened a more serious disaster; 90% of the oil was recovered and conveyed by pipe line to the ocean terminal at Madre de Deus. AG25 has a normal flow of 1,000 b/d.

The Petrobras program, which is ahead of schedule, provides for 70 development wells and 29 wildcats in 1956, as against a total of 55 wells in 1955. Slim holes are not included in these figures. Colonel Nuñes predicts that 1,454 wells will be drilled by 1960.

With the exception of the Bahia Reconcavo, which has been made accessible by exploration work in recent years, and the highly-developed South, the cost of drilling in Brazil is aggravated by the need

to clear forests and build roads for the transport of food, fuel, and equipment. Before starting on the Carolina wildcat in Maranham, now abandoned, it was necessary to build 144 miles of roads and 30 bridges. Material landed at the port of Parnaiba took 30 days to reach Carolina. Walter Link describes the Amazon basin as one of the world's most difficult regions for exploration and drilling.

Production—So far the only productive area in Brazil is the Bahia Reconcavo, which extends from All Saints Bay to a line passing near Coracao de Maria, south of Inhambupe and the Arapoa range. The Reconcavo fields produced 2,021,900 barrels (5,521 b/d) in 1955 and 4,228,330 (11,584 b/d) in 1956, on the basis of the production figures for the first nine months. Reserves are estimated at 250,000,000 barrels.

A new era in crude production opened on May 10, when President Kubitscheck inaugurated the six-inch pipe line, 32.4 miles long, which starts at the Catu field (Agua Grande), traverses Pojuca and Mata de Sao Joao, and continues to Candeias and the Mataripe refinery. Carrying capacity is 12,000 b/d, but can be raised to 22,000. Forty tanks, with capacities ranging from 250 to 20,000 barrels, are located at Catu, Pojuca, and Mata. The oil is stored at Mata and pumped to Candeias and Mataripe. Owing to high paraffin content it is heated before pumping and at three intermediate stations between Mata an Candeias.

The marine terminal and 125,000-barrel reservoir on Madre de Deus Island were completed in August, permitting an increase in crude from 7,734 b/d in July to 10,409 in August and an average of 20,000 from September onward.

The Catu, Mata de Sao Joao, and Pojuca fields brought in 158 highly productive wells. Catu produced 14,432 barrels on August 28, or twice the daily yield of the entire Reconcavo in June last, and is now the biggest producer, having outstripped Candeias. The productive area of the latter was found to exceed the earlier estimate in April, when oil was found at 5,200 feet at exploratory well No. 96, believed to be outside the area.

Any excess production over Mataripe's requirements of approximately 7,000 b/d, is shipped to Santos and pumped by the Santos-Sao Paulo pipe line to the Presidente Bernardes refinery at Cubatao. Brazil's 16,000-ton tanker, "Presidente Dutra," reserved for this traffic, had made three trips, carrying 349,000 barrels in all, by mid-October. Three trips will be made monthly, effecting an estimated saving on imports of $3.00 per barrel.

Refining—To mark the third anniversary of the establishment of the State monopoly, Petrobras called for preliminary tenders on October 3 for engineering works, materials, and equipment for a 90,000-barrel-per-day refinery, to be built in, or near, the Federal District. The plant is to be designed for the following outputs (in barrels per day): liquefied gas, 1,300; gasoline, 22,500; premium gasoline, 2,500; kerosine, 14,400; diesel oil, 16,400; fuel oil, 26,300.

Two other refineries are to be built, adding at least 80,000 b/d to refining capacity. According to an official spokesman, one will be located in northeast Brazil, presumably in Pernambuco, the other at Corumba, capital of Mato Grosso, provided the bill now before Congress is approved. Corumba is the Brazilian terminus of the railway to Santa Cruz de la Sierra, in Bolivia, and Colonel Nuñes told the Chamber of Deputies in September that a refinery at this position could only operate economically if supplies of Bolivian crude are guaranteed at reasonable prices.

Brazil at present has eight refineries, with a nominal processing capacity of 111,800 b/d: Manaus, 5,000; Mataripe, 5,000; Manguinhos, 10,000; Presidente Bernardes, 65,000; Capuava, 20,000; Matarazzo, 500; Uruguaiana, 300; Ypiranga, 6,000.

Several of these plants operate at more than normal capacity and, together, refine 125,000 b/d for a domestic consumption of 190,000 b/d. Presidente Bernardes has been refining 72,000 b/d since September 22 because of improved operating techniques. It began distributing premium gasoline (83-octane) to the Sao Paulo market in October. The output of its asphalt plant greatly exceeds the needs of the domestic market; the fertilizer factory is about to start production; and an ethylene unit is under construction. The value of the refinery sales totaled 3,510.6 million cruzeiros during the first seven months of 1956, as compared with 3,540 million in the 12 months of last year.

Mataripe, Brazil's other government-owned plant, refined an average of 6,840 b/d in June. The monthly value of sales rose from 45.1 million cruzeiros in 1955 to 58.7 million in 1956. The increase of capacity to 37,000 b/d is under way, and will be completed in 1958. A 2,800 b/d lube plant will be added, and facilities will include a 12,000 b/d catalytic cracking unit and a 60-ton daily paraffin plant. The value of the contracts signed with firms abroad is $25 million.

The Manaus refinery came on stream in September, and the first consignment of 16,000 barrels of refined products reached Belem early in October.

Ypiranga has been authorized to amplify its refinery in the city of Rio Grande, adding a vacuum unit and one for liquefied gas.

Despite increasing local production of crude and refined products Petrobras estimates that the value of imports will reach $270 million in 1956, as compared with $259 million in 1955. Comparing the first five months of 1955 and 1956, imports of crude increased this year by 870,276 metric tons, to 2,125,185; diesel oil, by 30,181, to 505,400; kerosine, by 9,221, to 232,625; aviation gasoline, by 28,807, to 113,126. Imports of regular gasoline and fuel oils declined by 436,158 and 296,241 tons, respectively, to 230,905 and 657,886.

The president of the Brazilian Bank for Economic Development announced in October that Petrobras has adopted the following targets for 1957-61, instead of those previously fixed for 1956-60 (which are shown in brackets): Crude production, 130,000 b/d (120,000); refining, 270,000 b/d (240,000), including the output of private plants; increase in tanker fleet to 500,000 tons (400,000). The program calls for an investment of 35,500 million cruzeiros, including the cost of exploration and other work. This sum covers the cost of imports, estimated at 15,400 million cruzeiros, or $307 million. The company's present resources, plus the proceeds of the new tax on liquid fuels, will amply cover the expediture. The revised tax on liquid fuels and lubricants is calculated to yield 88,700 million cruzeiros by 1960.

Tanker fleet—In 1956 Petrobras received two 1,200-ton ships, especially built in Germany to carry liquid gas, and a 1,200-tonner built in England to carry lubricants. The expansion program provides for the purchase of another vessel for lubricants and for ocean-going ships of a total tonnage of 180,000. The existing fleet consists of 22 ships, with capacity for 223,000 tons, and effected a saving of $900 million in freights in 1955. END

TABLE I—PRODUCTION IN BRAZIL

Field	No. of Producing Wells	Production (Barrels)	Wells Producing
Agua Grande (Catu)	26	153,635.73	16
Aratu	2	—	—
Candeias	80	119,683.87	53
Dom Joao	126	37,867.05	36
Itaparica	25	—	—
Lobato	4	246.26	2
Mata de Sao Joao	17	7,905.81	7
Paramirim	2	3,336.22	2
Pedras	12	—	—
Pitanga	1	—	—
Pojuca Central	6	—	—
	301	322,674.94	116

TABLE II—PRODUCTION AND CONSUMPTION IN BRAZIL

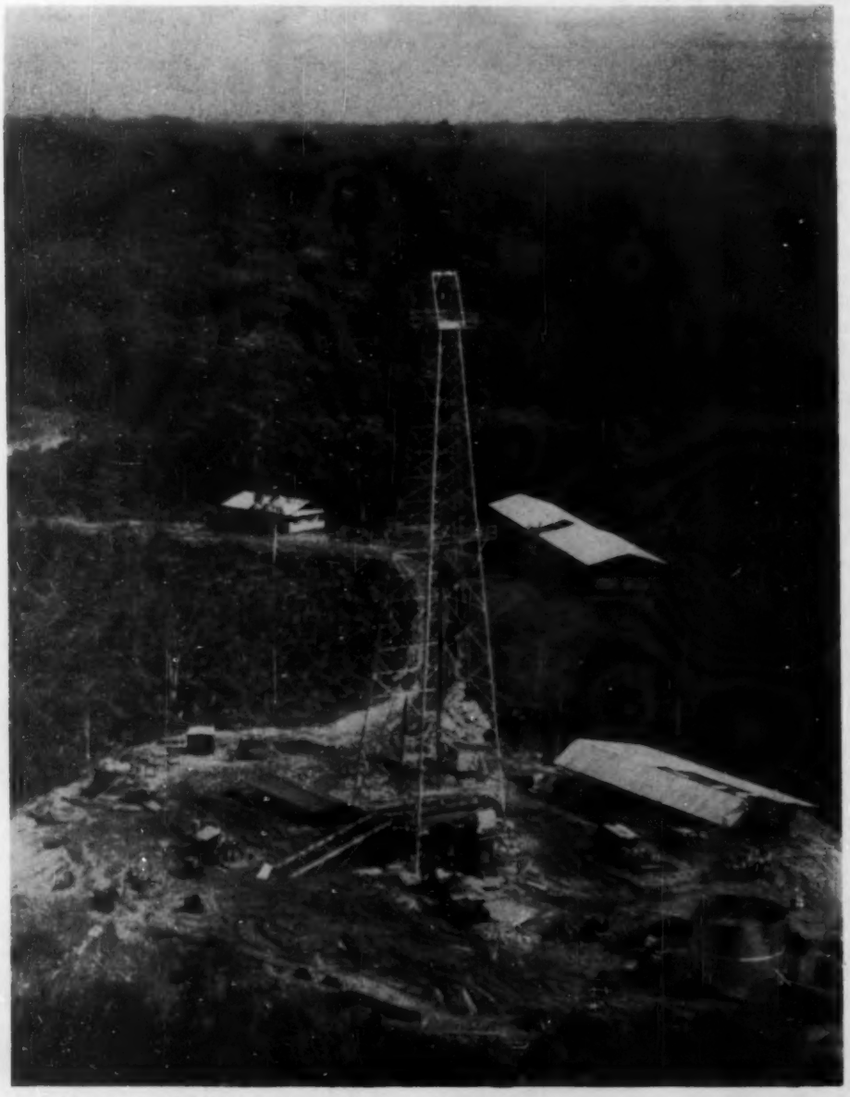
(5 Months 1956—Barrels)

	Production (1)	Consumption (2)	Ratio of Prod. To Cons.
Liquefied gas	430,446	538,892	80
Aviation gasoline	—	894,563	—
Regular gasoline	7,115,772	8,382,916	85
Kerosine	143,009	1,803,220	8
Diesel oil	945,320	4,430,060	21
Fuel oil	5,563,137	10,220,921	54
Lubricants	—	595,120	—

Despite its proximity to Venezuela, Colombian production is only a fraction of her neighbor's. Exploration is rising rapidly however, as . . . .

New Laws Encourage Colombian Oil Search

By Bernardo J. Caycedo



Shown is a wildcat 1.5° north of the equator on the Chagui River in southwestern Colombia. After years of study of the area, Socony Mobil oil men drilled a well, encountering all of the vicissitudes of operations in the heart of the jungle and against all of nature's odds to block men's wresting oil from the earth. After many tries to depths of 10,000 to 13,000 feet the well finally had to be abandoned at 13,107 feet. The $2 million venture was just another "duster", but as one author in this issue points out, "in the oil business new oil fields are found by dry holes."

ALL advantages accorded to the oil industry influence exploratory activities, the first step in the industry. However, a law granting privileges for exploration only is not sufficient to attract foreign investment if, after discovery, burdens on subsequent stages prevent reasonable profits. Therefore, adverse regulations on refineries or pipe lines, as well as severe taxation laws, will certainly discourage investments on exploration.

Colombian legislation during the past 25 years affords an example of the importance of suitable legislation and its influence on the movement of foreign capital in exploratory work.

When law 37 of 1931 was approved, the few exploration activities still existing under the "emergency law" of 1927 were discontinued. Companies affected by the new statute withdrew their technical personnel and cut down their staff, hoping the situation would improve.

Colombia deemed its new 1931 statute very satisfactory, but continued to lag behind Venezuela. The law, inspired by an acute sense of political sovereignty, was designed to force companies to begin operations. The companies, however, preferred to abstain from any activities to which the law could have been applicable.

Another basis for this restrictive and impractical regulation of 1931 was the idea, still prevalent in certain circles, that the companies were obtaining concessions with the sole purpose of holding acreage reserves for the future. The law attempted to compel them, under heavy fines, to develop areas by any possible means, even when geophysical studies demonstrated the absence of suitable structures.

The result of this severe policy was that, in trying to force the companies to explore and develop reserves, the law had exactly the opposite effect, and protected from competition the only active producer existing at that time, the De Mares concession in the middle Magdalena valley.

After a five-year period of thorough stagnation the law was modified in 1936. Although amendments included in law 160 of

1936 were not complete, the companies renewed exploratory activities, both in private and federal lands.

The experience in subsequent years was discouraging, since dry holes reached a high percentage and, in addition to physical difficulties, the regulations were interpreted in most cases against the interest of the industry. The "brief and summary" lawsuits for determining suboil ownership were neither brief nor summary. Some of them are still pending at the Supreme Court. Jurisprudence has not been uniform, and uncertainty about the applicable criterion has obliged the companies to contract with the government, as well as with the claimant of property, if the claimant has acceptable evidence concerning the title to his properly, in order to avoid jeopardizing their investment.

Nor was any reasonable deduction for depletion granted by the law, and many of its provisions were definitely contrary to sound oil-industry economics.

This critical situation reached its turning point at the end of 1949, when several American companies left the country and others were almost ready to leave. Their budgets were drastically reduced. The exchange problem was very serious. Dollars resulting from exports of coffee were not enough to meet the dollar needs of the country, and once again the progress of the industry came to a near halt.

The government then issued Decree Law No. 10, 1950. This new law granted exemption from the patrimony tax for capital invested in exploration, subject to the new rentals and royalties. Rentals in eastern Colombia were put at 0.10 pesos during the first and second years of the contract, to 0.50 pesos per hectare during the sixth and succeeding years. Annual rentals in western Colombia now range from 0.20 to 3.00 pesos. All rentals are reduced by one-half while drilling is proceeding and during the exploitation period. Royalties in eastern Colombia range from 3% to 13%, according to the distance from the sea port of exportation. On the continental shelf the royalty is 10%, and in eastern Colombia 3%.

The law also provided for surrender of concessions without drilling during the exploration period, when the contractor had proved that the result of technical studies did not justify exploratory operations with drilling equipment or the continuation thereof.

The "brief and summary" lawsuits for determining oil ownership were abolished under the new law, and deduction for depletion was granted equal to 10% of the gross production, less royalty, not exceeding 20% of the taxable net income. Amortization at 5% of investments or expenses incurred by subsidiaries in exploratory operations was authorized.

Under previous laws the general route of every pipe line was considered the shortest distance between the starting point and the terminal. Decree law 10 (1950) accepted as such route the most economical and convenient line from a practical point of view, in accordance with technical requirements. It also ended former restrictions on refinery locations in general within the national territory, thus ending previous limitations on certain reserved areas.

The new regulations had the effect of retaining in the country the companies which were almost ready to quit. However, the government realized that the abovementioned provisions were not sufficient to encourage the development of the industry. The next step was Decree Law 3419, issued at the end of 1950. It eliminated territorial reserves where formerly no concessions were granted without special approval of the Congress. These reserves (Art. 52, Law 37, 1931) practically froze large areas of the country, with no benefit to the nation. Now only the areas of oil concessions in the exploitation period which revert to the State shall constitute national reserved zones.

Decree Law 3419 also abolished former limitations on the number of contracts or the maximum of total areas obtainable by one person or company. Under previous legislation a company could hold one direct contract with the government and another contract by transfer from another concessionaire.

An extension of two years was accorded for initial exploration rights, thus extending the corresponding period up to five years in western Colombia and up to seven years in the eastern region. Taking into account the ordinary and extraordinary extensions, the total exploration period can extend to 11 and 13 years, respectively.

Contractors were permitted to renounce their concessions during the first three years of the initial exploration period, without presenting technical studies to prove that there was no justification to continue drilling. Such evidence is only necessary for the balance of the exploration period, prior to the date when it is obligatory to drill.

Extension for 15 years was granted for the production tax on private properties, as reduced by Art. 11, Law 160, 1936. The period granted for completion of a topographical survey of the concession areas was also extended.

When additional pipe lines were planned, new amendments to the transportation rules of the oil law were deemed necessary, and the government approved Decree Law 2270 in 1951. Most of its provisions were later ratified by Congress through Law 18 (1952). It included many incentives for construction of new pipe lines, both private and public.

Another incentive now relieves pipe lines constructed subsequent to October 5, 1952 from the obligation of ultimate return of the lines to the nation. This was a very important change from the previous system, whereby these expensive installations had to be transferred free to the nation at the expiration of the permit or contract. Taxes on pipe lines were put at 6% for the western region and 2% for the eastern region.

The former 30-year term for contracts on public pipe lines was extended by the 1951

Bernardo J. Caydeco has observed the development of Colombian petroleum since June 1928, when he became counsel and general attorney for the Texas Petroleum Company. He has been an editor, and head of the government's Public Lands Section. He is author of numerous legal works, in addition to a book and several historical articles. Folowing his resignation from Texas Petroleum in July 1956 he established offices as a private consultant and law practitioner in oil matters in Bogata.

law to 50 years. In addition, extensions of 20 years can now be granted, subject to the legal provisions in force on the matter at the time of each extension. Authorization was granted to old common carriers to adapt their contracts to the provisions on extensions of Art. 49 of the Oil Code, and on revision of rates for transportation.

Exemption from custom duties on pipe and equipment for pipe-line construction in eastern Colombia was provided.

For oil concessions in the eastern region, the regular exploitation period was extended to 40 years from the former 30, plus additional extensions of 10 years, subject to the conditions then in force.

The exemption granted for the importation of drilling equipment, for exploratory operations, plus spare parts and accessories, was considered a direct incentive to exploration. However, if this machinery is used later in an area during the exploitation period, the exemption is revocable and the custom duties must be paid.

Finally, a last series of very important legal amendments on annual deduction for depletion have had a direct influence on industrial programs and exploratory activities. These are contained in Decree Law N-2140 (1955) and its regulatory Decree N-2040 (1956). It is hoped these will be interpreted by the fiscal authorities in a satisfactory manner; otherwise they will not produce the expected increase in oil investment.

It is equally important that no discrimination be made which would deprive old producers of benefits which these decrees grant to new producers, thus breaking the accounting into two or more economic units rather than preserving the wise fiscal principle which consolidates all sources of income and expenses of a company into a single tax declaration.

Notwithstanding the need for clarifica-

(Continued on page 59)

promising structure said to have a closure of some 30,000 acres. Drilling is slow, at 3,940 feet in November, since spudding in last March. As may be seen from Table I, there are eight wildcat rigs and fifteen development rigs active in Colombia, which compares with 16 and 91 respectively in Venezuela.

At No. 13 on the map, which is the southern part of the De Mares property, Ecopetrol and Cities Service are doing geophysical work. A wildcat is expected to be spudded early in 1957. Cities Service holds some 2 million hectares within and without De Mares. The agreement calls for capital contribution of 25% by Ecopetrol and 75% by Cities Service Oil Co. Oil output will be shared in equal proportion after royalty. Cities Service will be the autonomous operator, and will pay a royalty of 17% for oil less than 25 API and 20% for above 30 API to Ecopetrol. The agreement also calls for a minimum investment of $7.5 million during the first five years (1956-1960) up to $10.5 million. E. H. Clayton heads Cities Service operations in Colombia.

Another operator is Forest Colombian Corp., an affiliate of Forest Oil Corp. of Pennsylvania. An agreement was signed between Forest and Ecopetrol to develop oil production from La Cira and Infantas oilfields in De Mares through secondary recovery water flooding methods. De Mares has yielded to date some 469 million barrels of oil and an additional 25% to 50% may be recoverable through water flooding. A pilot plant is now under construction at the field. The capital will be furnished 50-50 and net income is to be shared 62.5% by Ecopetrol and 37.5% by Forest. The latter is also interested in other oil prospects outside of De Mares.

Runs to stills have increased from 38,728 b/d to 46,230 last August. There is only one fully integrated oil refinery. It was built by Ecopetrol and leased to Intercol, located at Barranca. The others are topping plants. Colombia's oil consumption is now around 43,000 b/d, so that close to 25% of the market must be supplied by imports. Lubes represent a $6 million market of which 8.6 million gallons were imported last year. 113.2 million gallons of gasoline were imported in 1955 valued at pesos 32.2 million ($13 million). Gasoline imports will be reduced considerably when Intercol's new 28,000 b/d refinery now being built at Cartagena on the Caribbean coast is placed in operation during 1957. Bechtel was the successful bidder on this $30 million project. Facilities include two-stage pipe still of 28,000 b/d capacity; a cat cracker—Model IV—fresh field of 13,130 b/d capacity; and a polymerization unit of 3,600 b/d capacity. Other products such as avgas, lube oils, greases and asphalt production are not projected for the Cartagena Refinery. As may be seen from Table I, Intercol has not developed sufficient oil supply and now refines at Barranca the De Mares Ecopetrol crude, Velasquez Texas crude and its own 339 b/d production from Totumal and Buturama. The Cartagena refinery will process Velasquez 24.7 API crude which is being produced now at around 25,000 b/d and soon will be stepped up above 30,000 b/d.

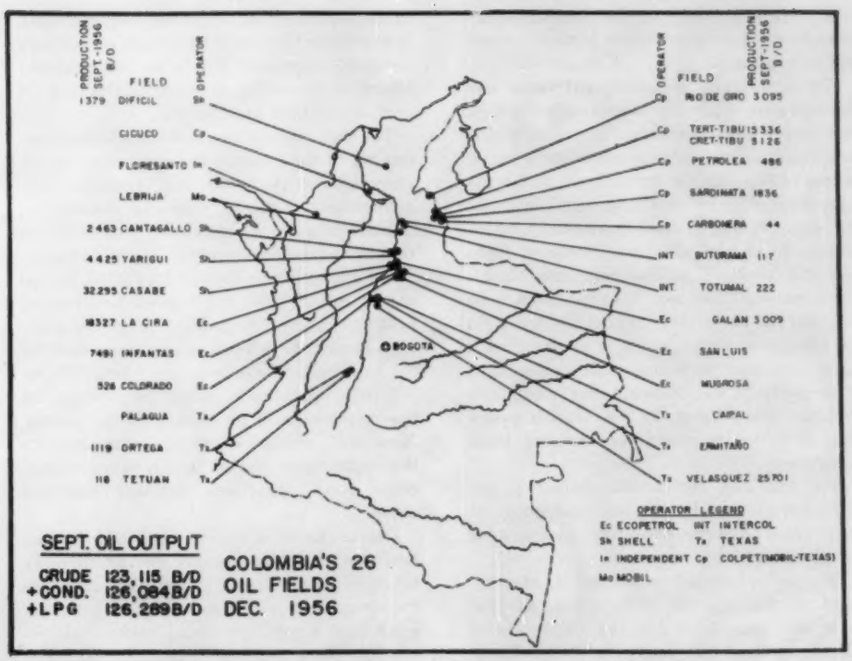


Fig. 2. Map showing Colombian oil fields and production.

Marketing is carried out principally by the six firms listed. Only four sell fuels, lubes and specialties. Before October 1955 Esso was the principal wholesaler and retailer in Colombia. In October 1955, Shell organized a marketing firm. In December last year an independent Colombian enterprise was organized. It is known as Codi and is headed by Pablo E. Pareja, former assistant manager of Esso Colombiana, with a background of 25 years of marketing experience. In the eight months, December-August, the motor fuel sales of these three marketers have been 159, 20.3, and 9.9 million gallons, respectively. Codi has completed another outlet at La Dorada and since then its sales are over 3 million gallons monthly, surpassing Shell volume. The products pipe lines financed in part by Intercol have made the entry of these new marketing firms in Colombia economically possible.

Colombia's motor fuel consumption in 1955 totaled 288 million gallons. For the first half of 1956 it was 152 million, an increase of 16 million gallons or 5.4%. Sales of LPGas through Colgate are becoming important and the major cities are being supplied an increasing clientele partial to the clean and convenient gas fuel. LPGas supply in 1955 came from De Mares natural gas operations, 69,850 barrels, Barranca refinery, 61,502 barrels; and Barco concession, Tibu plant, 3,509 barrels for a total 1955 LPGas supply of 134,861 barrels, all consumed. American LPGas interests associated with Sears Roebuck are investigating the market in Colombia and its potential expansion, based on Colombia's population of 12 million.

Colombia's oil output is less than one percent of the world total, nevertheless this small volume, 40 million barrels annually, has a most important place in the country's economy. Coffee is Colombia's chief crop and source of dollar exchange; oil is second. Colombia's international trade in 1955 amounted to $545 million, of which exports of coffee brought $463 million or 85% of dollar exchange. The oil industry sold to the Government at the official pesos 2.50 per dollar, $29.6 million or 5.3% which may be compared with the value of oil exports, Table I, of $61.5 million. The balance of some $31.9 million retained abroad goes for remittances as dividends, royalty payments on patents, payments of services, consulting, geophysical work, etc. Reinvestment of capital through payment for oil equipment and materials may amount now to around $15 million for the industry annually. Official data for December 31, 1955, reveal that of foreign capital registered as invested in Colombia, totaling 665 million pesos ($318 million dollars), 64% or 425 million pesos was in the oil industry. Of the $76 million pending registration, $64 million or 84% was for the oil industry. There are therefore some $268 million dollars of foreign capital registered as invested in the oil industry in Colombia.

The government of Colombia has repeatedly announced its favorable policy toward investments of outside capital and particularly for the oil industry. This policy has been translated in a practical way by tax legislation granting the oil industry in 1951 a greater depletion allowance and later in August 1955 establishing

(Continued on page 57)

Oil Development and Prospects

(Continued from page 37)

Exploration activity of the other companies has been restricted to geological and geophysical surveys and air mapping, which proceed very slowly because of the difficulties of the dense jungle and which will depend largely on the results of Texas efforts. In the most southern part, in the Perene region, east of its mining centers, Cerro de Pasco Corp., the principal mining company of Peru, has taken about 2.8 million acres and has started geological and air surveys by a Denver consultant firm, especially on the so-called Iscosasin structure.

Shortage of petroleum in Peru has already been felt on fuel oil, and about 2 million barrels of fuel oil had to be imported for the requirements of the Peruvian industry.

Refining activity is concentrated in International Petroleum Co.'s refinery in Talara of 45,000 b/d capacity, which processes also part of Lobitos crude for domestic consumption, and lately has processed Empresa Fiscal's crude, which could not be exported due to a shortage of tankers. It also supplies turbo fuel for the jet planes of the Peruvian army.

Empresa Fiscal's refinery, which had been transferred from Villar near Zorritos on the northern coast to Iquitos in the Montana, was rebuilt for 1,500 b/d topping capacity and put on stream in February 1956 to supply demand in eastern Peru of about 650 b/d. The crude is supplied by Ganso Azul.

The project of the Helios refinery for 2,000 b/d, to be constructed at the port of Pisco, about 150 miles south of Lima, is still in a preliminary stage. Its success is doubtful due to low ceiling prices for products in Peru and the higher prices for imported crude, on which it has to depend.

Search for oil in the Pisco region, which from the beginning offered very poor prospects, has been definitely abandoned after one wildcat by International and Sea Oil was abandoned in October 1955 at 3,126 feet.

In Chile crude production from the Magellan fields increased in 1955 by 48% to 7,060 b/d. A total of 220 wells has been completed in Magellanes from the date of discovery in 1945 to the end of 1955. 93 wells struck oil, 36 gas and 92 were dry. In 1955, 58 wells were completed, with five rigs active, of which 25 yielded oil and 8 gas. Principal producing pools were Sombrero, Victoria Sur, Chillan and Cullen. Because of the increasing yield of Cullen this pool was connected by a 6-inch pipeline of 22 miles length with Chillan. New gas pools were discovered in Manantiales Sur and Calafate. In the first six months of 1956 output increased newly to an average of almost 9,000 b/d, and in August of this year it reached 10,174 b/d. 34 new wells were drilled during this period, of which 11 yielded oil, eight gas and 15 dry.

Chile's domestic production now supplies 50% of demand of the new 20,000 b/d national refinery at Concon, constructed by M. W. Kellog Co. and inaugurated in November 1955. Further expansion is expected. The balance is supplied by Venezuelan crude. The Concon refinery already supplies almost entire domestic demand in gasoline and diesel. Only heavy fuel oil for the northern mining region must be imported. Construction of a products line from Concon to Santiago is projected.

Since the year 1955 a change in the Chilean petroleum legislation, permitting the entrance of private companies, national and foreign, has been considered, but the first draft has been withdrawn. A new draft has been submitted recently to the President of the Republic. It provided for 10 concessions of 50,000 hectares each or 1,235 million acres total for exploration to each applicant. Profits of exploitation are to be divided 50-50. Tierra del Fuego remains reserved for the government's Empresa Nacional de Petroleo.

In Bolivia oil output stepped up rapidly, slowed only by the lack of sufficient outlets. Production in 1955 of 2,692,414 barrels or 7,376 b/d showed an increase of nearly 60% over the preceding year. The rise continued in 1956 with a yield of around 8,500 b/d in the first semester of this year and exceeded 8,800 b/d in August. Potential is about 12,000 b/d, and a considerable number of wells are shut in. In 1955 YPFB completed 21 wells, of which 19 yielded oil. During the first 8 months of 1956, twelve more wells were drilled, all of which are now producing.

YPFB now has 11 rotary rigs and has spudded exploration wells on the Itapirenda structure south of Camiri and in Bellavista in the Mancorainza area in the Sierra de Aguarague in the south. Reserves in Camiri and Guairuy are calculated by new surveys in 1955 at 70 million barrels.

Besides geological and geophysical, including seismic, surveys in the Carandaiti region on the Chaco border, the first geological commission of YPFB has been sent to the known prospective Caupolican area and the Beni region in northern Bolivia.

The extension of the pipeline system to Yacuiba on the Argentina frontier and to La Paz now permits export to Argentina and Peru. A pipeline to southern Peru is at present being studied by a commission of both countries for avoiding the transport over Lake Titicaca. Gasoline is also shipped to Chile over the railway to Antofagasta, and to Brazil over the new railway to Puerto Suarez on the Paraguay river, where it will link, after completion of the bridge at Corumba, with the Brazilian railway to Sao Pualo. Gasoline to Paraguay is transported to date by truck. An agreement with Uruguay for supply of crude has been concluded.

After enactment of the new favorable petroleum law in 1955, representatives of different foreign companies, including, Mobil Oil, Shell, International, Richfield and a commission of the Japanese Teikoku Oil Co., have visited Bolivia. A contract with Gulf Oil Corp. was concluded, and lately representatives of Pure Oil, Standard Oil of Ohio and newly Richfield have shown interest in applying for concessions. Finally in October, Shell Prospecting Co. filed applications for large areas in the departments of Tarija, Chuquisaca, Santa Cruz, La Paz and Beni.

Bolivia, with its large favorable structures as a source bed, whose depth in the Devonian shales reaches 10,000 feet, has high-grade crude which averages 54 API in Camiri and reaches 61 API in Guairuy. Bordering the biggest consumer nations in South America, Argentina and Brazil, it will be linked by the projected pipeline in Arica with the Pacific Ocean. It offers one of the brightest prospects in South America, provided the political situation remains stable and the rapidly growing inflation is halted. END

New Era Seen in Colombia

(Continued from page 56)

the 50-50 split for net profits. It was even better for oil operations in Colombia's Llanos region where it is split 40-60, the latter in favor of the operator. As of August 1956, a decree regulating the depletion allowance was issued. The latter grants oil producers a graduated deduction starting at 10% of the gross if no further exploration is carried out to seek new oil supply. The deduction is increased to 25% for oil producers who invest no less than $800,000 annually. The 25% is also granted to future oil producers with new oil production. Net income is split 50-50 with the government and takes into account other payments the operator has made in royalties and taxes.

Official take 1951-1954 has declined per barrel of oil produced as a result of the greater depletion allowance. Official data shows that Colombia's oil fiscal income 1950-1954 amounted to $17.1—$24.9—$25.8—$21.8—$15.2 million dollars yearly which represented in turn of the total fiscal income 6.5%—7.3%—8.6%—6.0% and 3.0%.

On a per barrel of oil produced basis which was taxed, the unit payment to the Colombian government amounted to 50.1¢, 64.8¢, 65.3¢, 54.1¢ and 53.5¢ U.S. cents per barrel. This unit payment may be compared with the data for Middle East and Caribbean Area oil supply countries, appearing in Table II which shows that Colombia's oil fiscal take is comparable to competing oil supply countries. In Venezuela oil fiscal income averages around 60% of the total government revenues; in Middle East countries this percentage goes from 50% to close to 100%. In Saudi Arabia it is 75%; in Iran 38%; in Iraq 53%; in Peru it is around 9% and in Colombia 6% of total fiscal income. Colombia therefore is less dependent on oil income than other oil supply countries. END

Venezuelan Oil Boom

(Continued from page 33)

equaled the company's original bid for the block, which left it with a net 50% interest and its money back. Drilling will reportedly begin during early 1957.

Venezuelan American Independent Oil Producers Association is an interested company on which no information previously was forthcoming. It is now reported, however, to be backed by Ventures Ltd., a worldwide mining concern headed by Robert B. Anderson, president. Anderson was manager of the W. T. Waggoner Estates near Vernon, Texas, for 16 years. He became Secretary of the Navy under President Eisenhower in February 1953 and, later, Under Secretary of Defense, a post which he resigned in August 1955. Blair interests of New York are also associated with Venezuelan American, which accepted a commitment to refine 30% of its production in Venezuela (double the 15% minimum) and a 20% royalty, plus a $19.4 million bonus for 24,700 acres. Lot V 574 was recently farmed out to The Atlantic Refining Co. and Sun Oil Co. The two companies are operating on a 50-50 basis and plan to start drilling operations during the first half of 1957.

Other companies planning drilling on new Lake concessions are Superior Oil Co., which will begin during February on its group 75 tract; Signal Exploration Co., to spud in during April on its lot 4; and Sun Oil Co., which with Atlantic and Seaboard will begin drilling during the first two months of 1957. Creole and Shell companies also have new concessions and are in the best position to begin operations immediately, having both the experience and necessary facilities for offshore drilling platforms.

Refining in the country has taken an upward swing with the increased demand for heavy fuel oils and the higher degree-days in the first cold weather of the 1956 fall season.

Refining capacity is undergoing considerable additions, which are scheduled to bring it toward the 750,000 b/d mark in 1958, and to about 1,000,000 b/d in 1960. The latest addition is a 10,000 b/d plant at Bajo Grande, on the west shore of Lake Maracaibo by Richmond Exploration Co.

Creole Petroleum Corp. has raised its capacity to 294,000 b/d, and may double same by 1960. This program would lift the Amuay plant to about 500,000 b/d. The capacity of the Caripito plant is also to be expanded.

Cia. Shell de Venezuela has the largest refinery, and plans to add an 80,000 b/d distillation tower in 1958 to make its Cardon refinery capable of processing 255,000 b/d. A 35,000 b/d catalytic cracker is to be added in 1957, plus an alkylation unit. 1958 capacity will reach 293,000 b/d.

The government plans to have a 3,000 b/d refinery in operation next year in connection with its petrochemical plant at Moron. The government has a $150 million petrochemical expansion plan under way, and has recently taken over its construction through the new Petrochemical Institute.

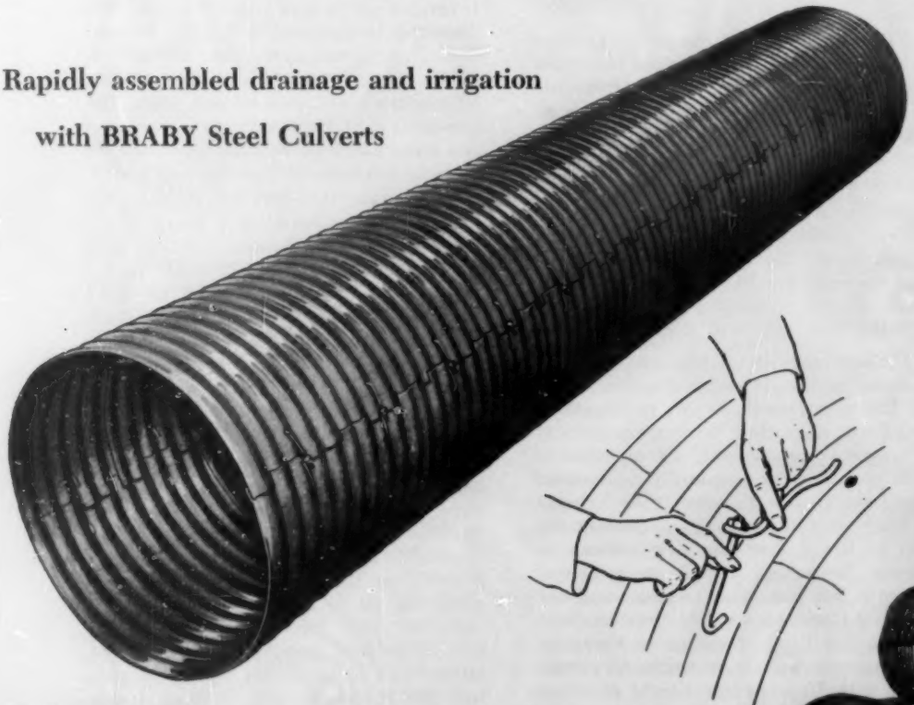
The largest amount of Venezuelan production is exported. The percentage of crude exports has been declining because of growing domestic refining capacity (with consequent rise in refined exports), and the rising internal demand.

VENEZUELAN CRUDE EXPORTS (Barrels)
7 Months—1956

Aruba	102,359,277
U. S. A.	90,606,450
Curacao	69,204,341
Canada	41,455,667
Netherlands	16,369,845
Brazil	11,637,764
United Kingdom	11,542,540
British West Indies	9,789,731
Argentina	8,709,511
Puerto Rico	4,672,835
Uruguay	3,554,014
Italy	2,919,371
France	2,467,460
Camay Islands	2,070,234
Chile	2,059,610
Germany	1,611,341
Belgium	984,718
Sweden	666,778
Norway	379,790
Australia	264,727
Portugal	106,930
Cuba	100,602
TOTAL	383,533,536

The sum of all these oil activities points toward a brighter future for Venezuelan oil than heretofore. Although it has long been known as one of the most progressive of the oil countries, Venezuela has a golden opportunity in her new oil importance to achieve that diversification and stability in her economy which has long been the country's goal. END

Rapidly assembled drainage and irrigation with BRABY Steel Culverts



These galvanized corrugated steel culverts are manufactured in standard diameters from 12in. upwards and in thicknesses from 18 g. to 10 g. The Units designed for economical shipment, are easily and securely fitted together on the site. A leaflet with details and instructions will be forwarded on request.

BRABY

FREDERICK BRABY & CO. LTD.

EXPORT OFFICE: 110 CANNON STREET, LONDON, E.C.4.

TELEPHONE: MANsion House 6034 CABLES: Xenophon Cannon London

WORKS AT: London, Crayford, Liverpool, Glasgow, Bristol.

New Laws Encourage

(Continued from page 53)

tion of the exact meaning of some clauses, the decrees are very important in encouraging explortory operations. The new statute, which replaces Decree Law N-617 (1955), divides all oil operations in the country into a western and eastern region.

The annual deduction for normal depletion on the basis of fixed percentage in the western region is equal to 10% of the gross value of the raw material, less a sum equivalent to the royalties to private owners or to the nation. This percentage may not exceed 35% of net taxable income.

An additional extraordinary deduction of 15% shall be accepted in the western region, provided the exploiting oil companies invest a sum not less than 2,000,000 pesos (official rate of exchange) annually, in exploration in any part of the country, directly or by means of subsidiary companies.

These two deductions are not subject to the amount of the real investments made in the concessions or properties which are in production during the corresponding taxable year. They may not exceed, in conjunction, 35% of the net taxable income, computed before said deductions; this limit will be raised to 50% if new commercial production is begun after decree law.

Under the new decree, expenses or investments which have an unproductive result in the western region may be amortized by a charge to gross income of not exceeding 10% of such investments. New investments of less than 2,000,000 pesos annually do not have the benefit of 15% of extraordinary deduction, but they are entitled to an ordinary deduction of 10%, plus a special deduction not exceeding 5%.

On any future commercial production in the western region, the income and related taxes, plus royalties payable to the nation, will not be greater than 50% nor less than 40% of the net taxable income and the value of participations or royalties.

The exploitation period in the eastern region was increased to 50 years, and may be extended for another 20 years, under the new decree. No surface rentals are payable to the nation in the eastern region during the time drilling is maintained.

The normal deduction for depletion in the eastern region, based on a fixed percentage, and without being subject to total investment, is equal to 28% of the gross value of the natural production, after deducting the equivalent of participations paid to the nation or private persons. In this case, the extraordinary deduction of 15% is excluded. The percentage may not exceed 50% of the total net taxable income.

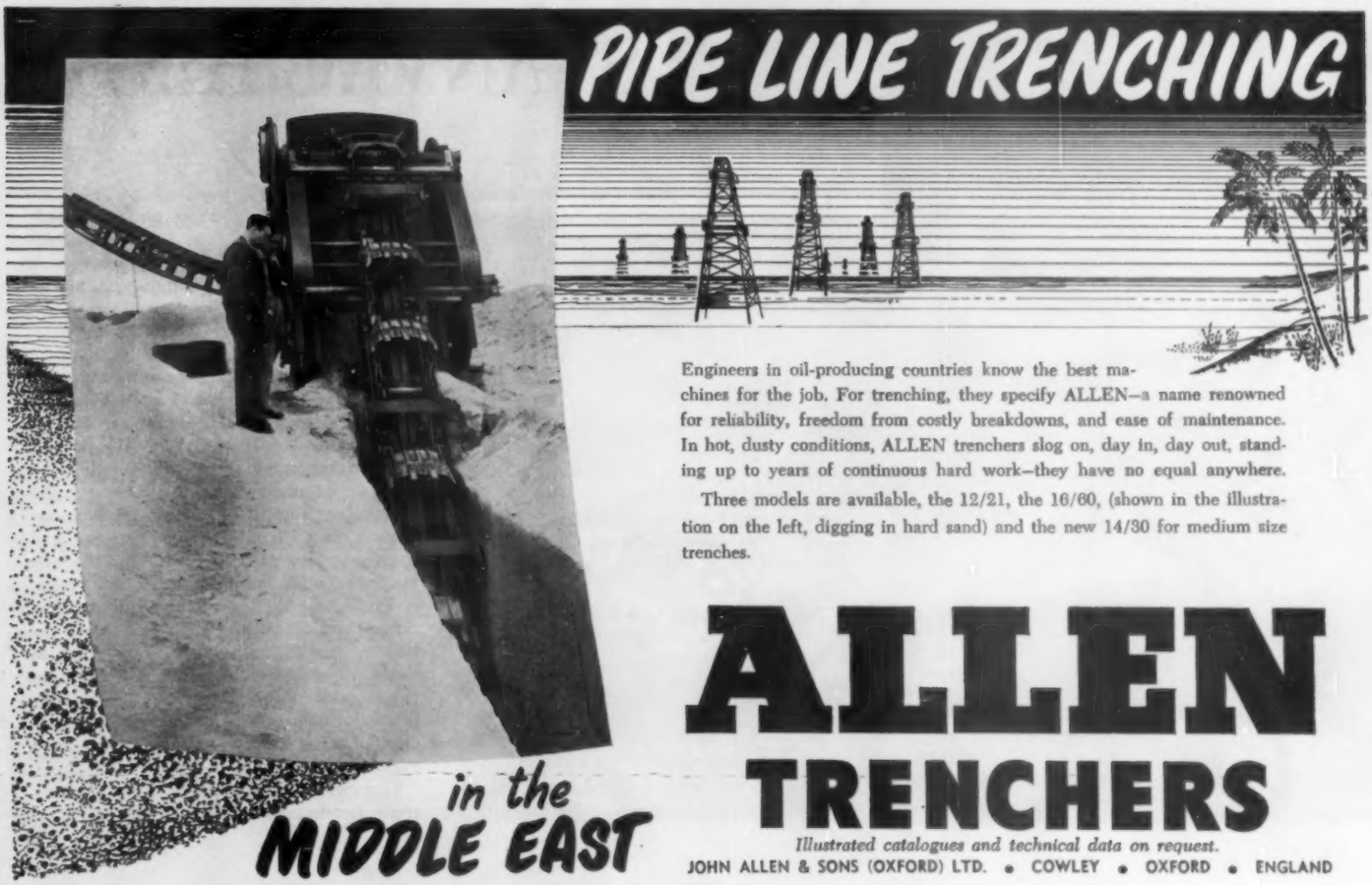
In the eastern region the aggregate of income and related taxes, royalties, etc., may not exceed 40% of the amount resulting from addition of net taxable income to the total value of royalties or participations.

Investment and expenses in exploratory operations in unproductive areas of the eastern region may be handled as either losses deductible from gross income for the year in which the area is abandoned, or capitalized to be amortized by depletion.

The tax on pipe lines to be constructed in the eastern region was reduced to 2% of the amount determined by multiplying the number of barrels transported by the transportation tariff.

A final decree was recently approved. This Decree Law 1262 (1956) is not exactly an incentive; rather it is a statute forcing the companies to protect their interests by speeding their programs. They no longer may hold their applications without completing the proceedings for the execution of contracts. The areas abandoned by applicants or contractors revert to the State and the technical studies become the property of the government. The reverted areas may be contracted with other persons or companies without submitting them to Art. 21 of the Oil Code.

This exemption, together with the special agreements signed by the government on certain areas, in fact will remove these areas from the requirements of the general oil legislation, thus creating two different systems: the one submitting regular contracts to all the requirements of the Oil Code; the other, subject to special clauses and exceptional conditions, with future results which cannot be predicted. END



Engineers in oil-producing countries know the best machines for the job. For trenching, they specify ALLEN—a name renowned for reliability, freedom from costly breakdowns, and ease of maintenance. In hot, dusty conditions, ALLEN trenchers slog on, day in, day out, standing up to years of continuous hard work—they have no equal anywhere.

Three models are available, the 12/21, the 16/60, (shown in the illustration on the left, digging in hard sand) and the new 14/30 for medium size trenches.

ALLEN TRENCHERS

Illustrated catalogues and technical data on request.

JOHN ALLEN & SONS (OXFORD) LTD. • COWLEY • OXFORD • ENGLAND

Office routine is fully automatic at Stanvac's new headquarters. Dictation of messages is handled on a telephone-like device which transmits the message to recording machines in the transcription center for later typing. This phone is activated by a button on the hand instrument beneath the dictator's middle finger. There are 266 remote dictating stations like this one, which connects with one of the 28 central recorders which is not in use when the receiver is lifted. The capacity can be expanded to 400 stations, with 40 recording machines.

Focal point of Stanvac's communication system is this nerve center of the transcription section. From the recorders (left) the flow of dictated correspondence and memoranda is distributed by supervisors at the control panel (center) to the transcriptionists. Telephone circuits incorporated in this Gray Phon-Audograph equipment enable the dictator to notify the operator when he has filled the disc on which his dictation is being recorded. Operators also proofread finished work before routing it back to its source via the fully automatic high-speed pneumatic tube carrier system. During a normal working day, the system dispatches approximately 2,800 carriers, representing 550 container-miles a day en route.

Flow of material via the automatic high-speed pneumatic carrier system is shown by this diagram.

STANVAC HAS A

THE recent opening of the new administration headquarters for Standard Vacuum Oil Co.'s globe-spanning operations in a suburb some 25 miles north of the city of New York marks the culmination of plans begun in 1952 to house under one roof the rapidly expanding international ramifications of this American petroleum giant.

A large, handsome, modern three-level structure on a 55-acre wooded tract, located at 1000 Westchester Ave., in White Plains, New York, now provides coordinated and consolidated direction of Stanvac's manifold operations in the Eastern Hemisphere. From its organization in 1933, the company's overseas operations had been directed from 26 Broadway and other metropolitan New York offices.

The new building took two years to construct. Ground was broken in April of 1954; cornerstone laid in June of 1955; and the headquarters were opened for business June 1, 1956.

Stanvac's integrated overseas operations serve more than 50 countries and territories in Asia, Africa, Australia, and New Zealand —a trading area encompassing about a third the world's population. The new home-office building houses some 700 headquarters employees, but these constitute but a small percentage of the company's global working force. Numbering almost 42,000 throughout the Eastern Hemisphere, 95% are nationals of the countries in which they live and work.

Engaged in all phases of the oil industry, Stanvac explores for oil in such places as India, Pakistan, the Philippines, British Somaliland, and New Guinea. About half the company's crude-oil requirements come from its producing fields in Sumatra; the remainder, from the Persian Gulf. It maintains a fleet of more than 50 owned and chartered tankers which transport the raw material to its refineries in South Africa, India, Indonesia, Australia, and Japan. The refined products are then conveyed by tanker, truck, tank car, and ox cart to Eastern Hemisphere consumers. To keep in touch with these integrated operations, Stanvac's home office in an average month dispatches or receives more than 5,000 overseas messages by cable or radio.

To supervise operations in these far-flung areas, headquarters personnel traveling on

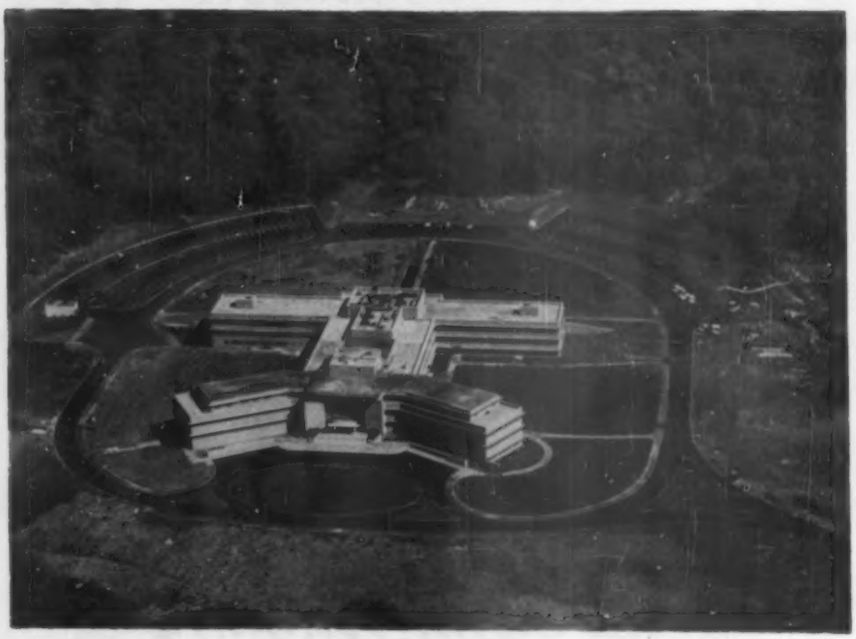
Motor coach brings visitors for a trip through the new Stanvac building on Open House Day last October.

Visitors from far-away places join the trip through the new Stanvac headquarters in White Plains, N. Y.

The board room at the new Stanvac international headquarters is paneled in American butternut wood. For practical usage of the decorative map of the world, sliding, mechanically-operated area maps in larger scale are included in the room design, and are used for easy, pinpoint reference to the company's extensive operations in the Eastern Hemisphere.

NEW HOME

Aerial view of Stanvac's international headquarters building at White Plains, N.Y.



company business last year covered an estimated 10 million man-miles. Language courses at Stanvac's White Plains offices train the overseas-bound employees to speak the native tongue of the Asian country to which they are being assigned. The company must be ready to do business in languages ranging from Bantu to Pidgin English and in at least 1,000 regional dialects.

The new headquarters building has a floor area exceeding a quarter million square feet, about the size of five football fields. With three levels and a roof setback, two floors are occupied by the company's operating departments, the director's offices being grouped on the roof setback. Completely airconditioned and sound-proofed, every modern recreation and dining facility is provided. The latest in automated interoffice communications, routing, dictating, filing, and similar systems have been installed. For instance, a fully-automatic, high-speed, pneumatic tube carrier system virtually puts all documents at the fingertips of the entire staff of more than 700 employees.

END

International News and Notes

Oil Famine in the Eastern Hemisphere

Short of a complete nationalization of Middle Eastern oil resources, the worst fears of the West have been realized in the Middle East. The flow of Mid-East oil to western Europe, the world's largest crude-importing area and dependent for over 90% of its oil supply on the Middle East, has been curtailed to a fraction of its former volume.

In a few hours following the invasion by Israel in the closing days of October, traffic through the Suez Canal began to halt. It came to a complete stop when the seriousness of the hostilities became apparent to company observers and when the first of a series of ships was scuttled in the canal. Similarly, in reponse to a plea from Egypt, the pipelines belonging to Iraq Petroleum Co. were crippled, November 3, when sabotage hit the three pumping stations (T-2, T-3, and T-4) which are located within Syria.

The total deficit in oil to Europe is in the neighborhood of 1.75 million b/d. This is comprised of about 550,000 b/d from the pipelines and 1,200,000 b/d from the canal. Of the two, the canal loss is the larger, and British and French forces are busily clearing wreckage on their upper end of the canal; however, they only control about one-quarter of the 101-mile waterway. In the upper part under their control a barrier of more than 20 blockships has been sunk in just under two miles from the Central Mole to Allas Hilmi Basin. They completely block the canal and most of Port Said harbor to ships of over 17 feet draft. The next major obstruction, going south from Port Said through the canal, occurs below British-French control at the El Firdan bridge. It has blown up and lies across the canal, together with a pontoon bridge farther down.

Oil storage tanks set afire by bombardment of Port Said.

The Suez Canal Co.'s dredgers have all been sunk in the canal, and the maintenance shops have nearly been destroyed. The dredgers lie above and below an LST loaded with concrete which was sunk across the canal by the Egyptians. It completely blocks passage by larger ships just south of Lake Timsah, and will have to be destroyed. The destruction of the dredgers is particularly important in view of the extensive dredging operations of more than three million cubic meters of mud yearly which have to be scooped out to keep the canal open to vessels of the maximum 34.6 feet of permissible draft.

A total of about 27 ships has been sunk in the canal, of which 10 are in the channel. Two salvage companies, the 123-year-old Danish company, E. M. V. Svitzer, and L. Smit & Co. of Rotterdam, have been hired by the United Nations to clear the canal below the British and French area. The Svitzer company dispatched the 672-ton "E. M. V. Svitzer" and the 569-ton "Protector" to work on the upper and lower ends of the canal, respectively. The Rotterdam company has also dispatched vessels to the canal. Altogether, repairs to the canal and pipeline will undoubtedly take two to six months. This means at least two months' supply for Europe are necessary from other sources.

The pipeline from Iraq itself is intact, and can deliver around 200,000 b/d utilizing the one pumping station, T-1, which is in Iraq. Repairs to the others will take about five months. Nothing can go through the canal for an indetermined time, certainly not before the end of 1956. The resulting supply deficit will have to be made up mainly from the Western Hemisphere. Although the productive capacity is available in the U. S., according to reports, the facilities to get it to tidewater do not exist. Probably around 800,000 b/d from the U. S., plus some 50,000 b/d from Venezuela, is available at this time. This is in addition, of course, to extensive crude and product inventories which are on hand. It will necessitate rationing in European countries, plus extensive purchases in the U. S.

The situation may lead to some peculiar situations. Tapline, the transportation affiliate of Aramco, is still functioning but is not making any deliveries to French or British tankers, nor to any tankers bound for those countries, at the Arabian government's request. This could mean that Tapline crude will flow to other countries of Europe and some to the U. S., with U. S. crude flowing to England and France.

Consumers in Israel and European countries were quick to feel the oil pinch. Israel received news that her agreement with Russia for supply of about one-

(Continued on page 78)

When measuring the costs of a hole in the ground...

Price is not a wise cost comparison

"Blue Demon" Bit performance gives proven cost reduction

U.S. Patents 2,615,684 & 2,666,622 — Others Pending

FIGURING bit cost on the price of the bit does not give a true cost comparison, since a number of variables are involved . . . rate of penetration, footage per bit, round trips required, bit service and finally bit cost per foot of hole drilled.

Hawthorne's "Blue Demon" Carbide Insert Rock Bit has become the leading all-formation drill bit in the exploration industry . . . used by more drillers than all other drag-type bits combined.

These field-proved replaceable blades, with superior inserts on the self-sharpening cutting edges, give faster, smoother penetration in hard formations . . . drilling from top to bottom without tripping between soft and hard formations.

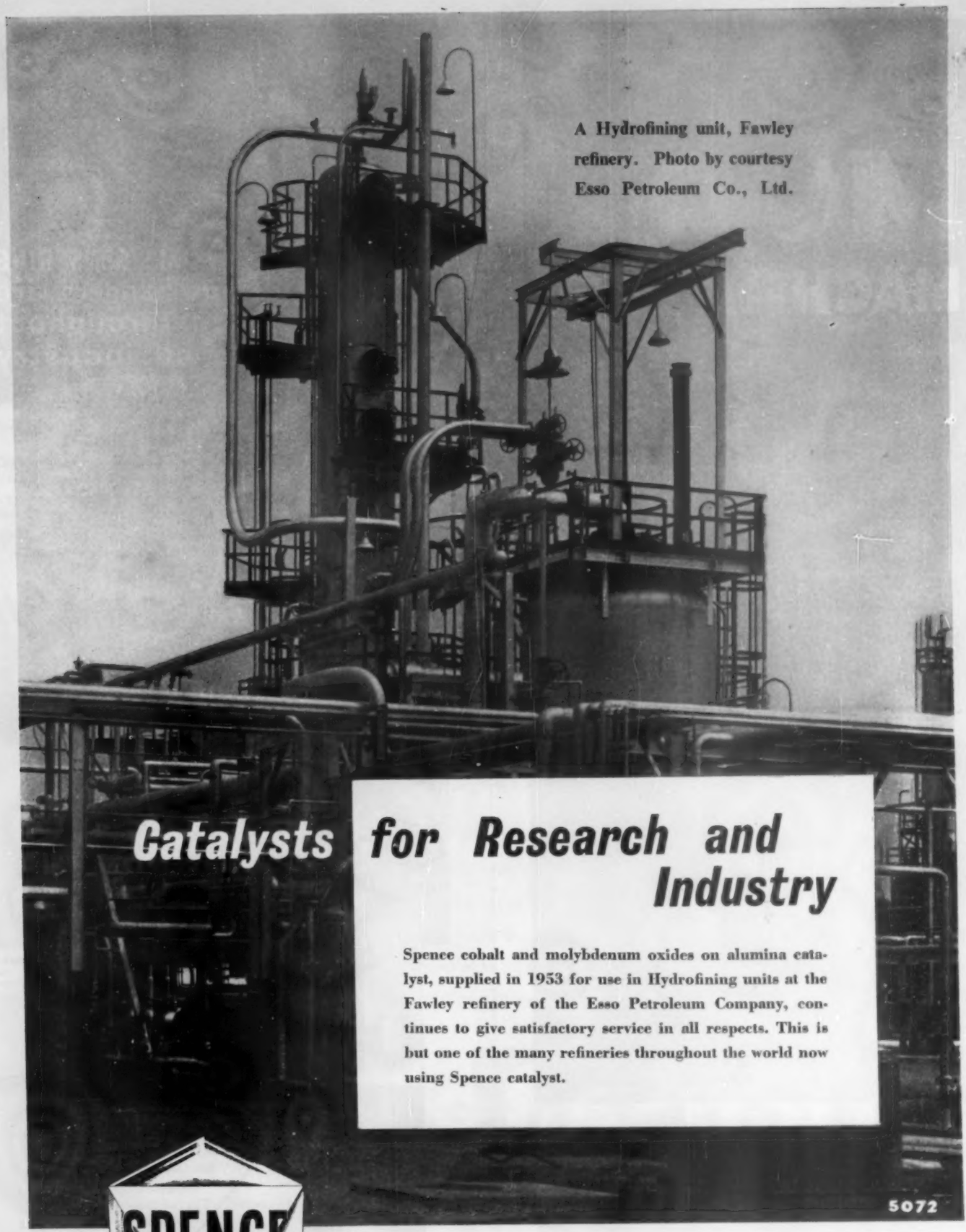
Ample stocks of popular bit sizes are maintained in every active exploration area to give you prompt, low-cost on-the-drill bit service, and experienced field service engineers will help you with your special drilling problems.

Drill more footage faster, smoother with long-lasting "Blue Demon" Bits, and cut your cost per foot of hole.

WRITE FOR ILLUSTRATED CATALOG.

HERB J. HAWTHORNE INC.

P. O. BOX 7366, HOUSTON 8, TEXAS
Cable Address: Hawbit



A Hydrofining unit, Fawley refinery. Photo by courtesy Esso Petroleum Co., Ltd.

Catalysts for Research and Industry

Spence cobalt and molybdenum oxides on alumina catalyst, supplied in 1953 for use in Hydrofining units at the Fawley refinery of the Esso Petroleum Company, continues to give satisfactory service in all respects. This is but one of the many refineries throughout the world now using Spence catalyst.

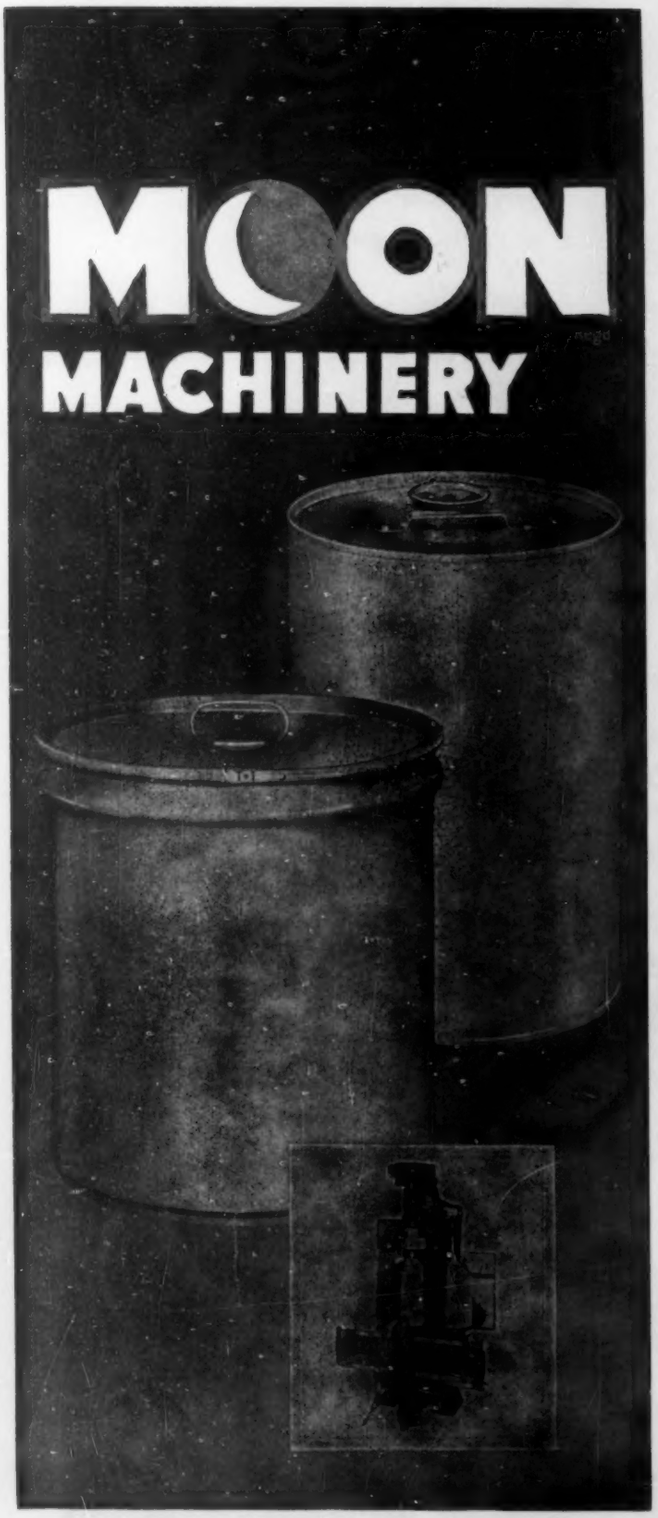
5072

SPENCE

PETER SPENCE & SONS LTD.

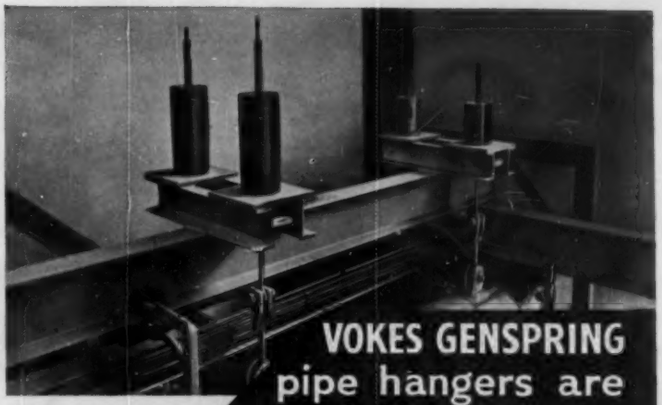
WIDNES • LANCS • ALSO AT LONDON & BRISTOL

MOON MACHINERY



Makes fine drums!

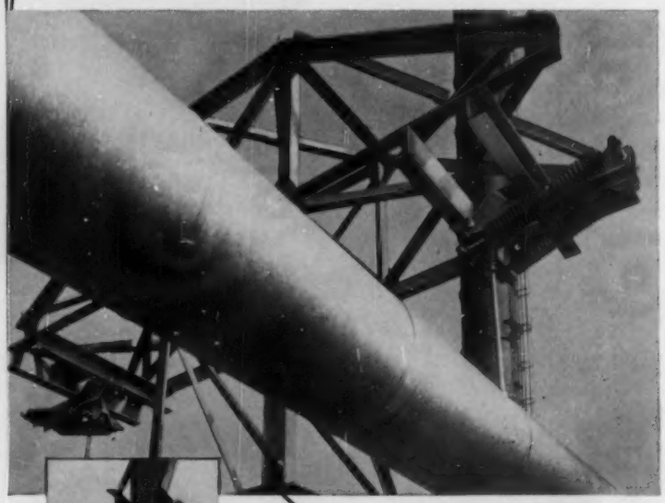
MOON BROTHERS LIMITED
BEAUFORT RD, BIRKENHEAD, ENGLAND



Photograph by courtesy of The Associated Ethyl Company Limited.

VOKES GENSPRING pipe hangers are used throughout the oil industry

At their Ellesmere Port Works in Cheshire, The Associated Ethyl Company Limited have made use of VOKES GENSPRING Variable Support Pipe Hangers to control movement which could set up very great stresses in the piping. 'Shell' have also incorporated VOKES GENSPRING hangers throughout the Platforming Unit at their Stanlow Refinery in Cheshire.



Photograph by courtesy of 'Shell'.

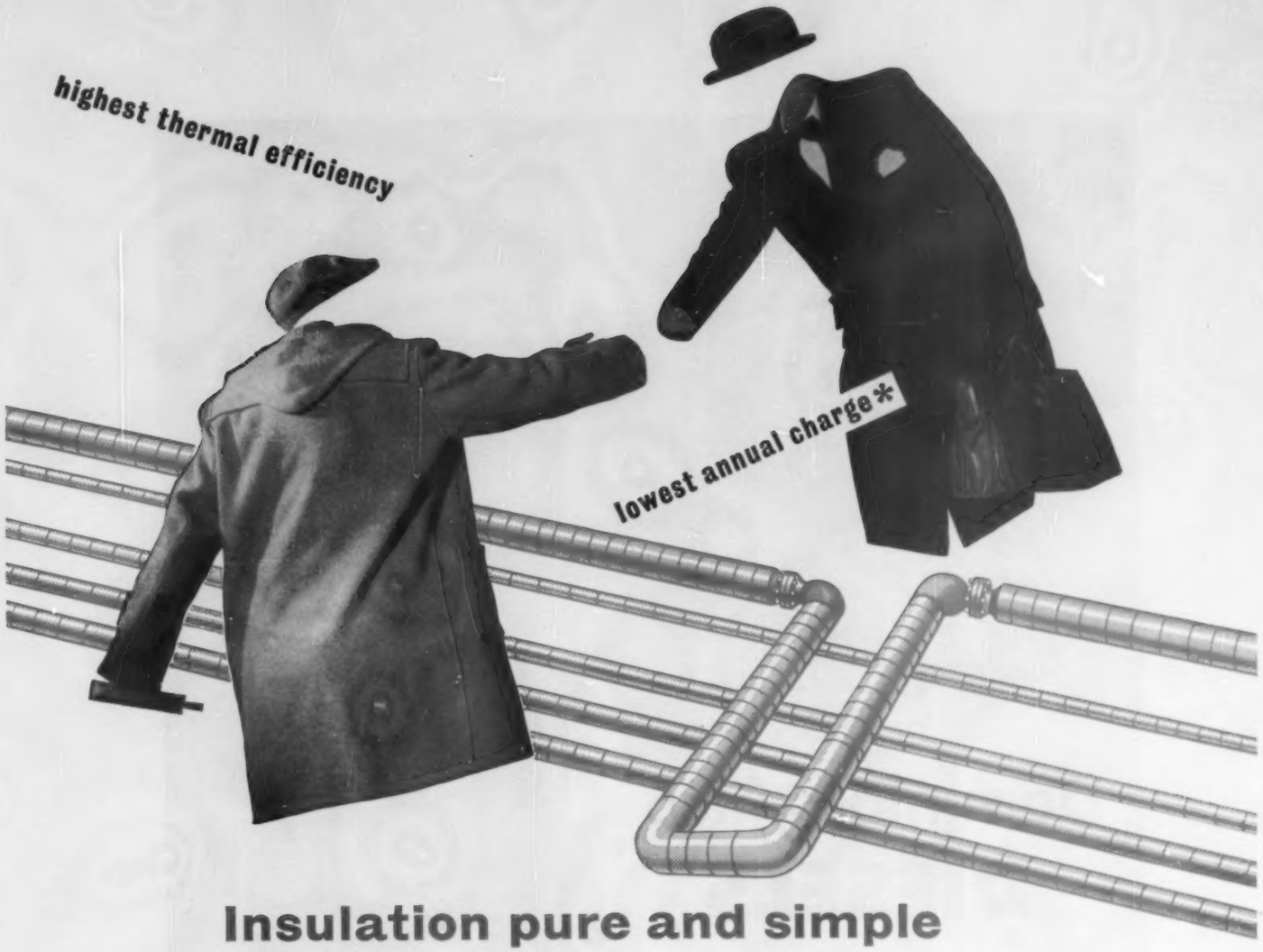
VOKES GENSPRING Variable Support Hangers are specifically designed for the control of vibration and limited thermal movement of piping, but where piping systems need to be 'floated' to offset the effects of extensive movement, Vokes Genspring Constant Support Hangers should be used. The full range is detailed in the Vokes Genspring catalogues available on request.

VOKES GENSPRING

SUSPENSION SYSTEMS

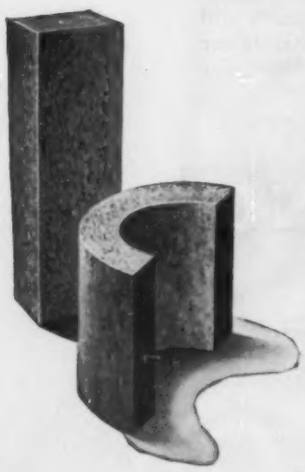
DEPT. S/3 · VOKES GENSPRING LIMITED · GUILDFORD · SURREY

VG/11



Insulation pure and simple

To begin with CAPOSITE needs no undercoat for protection—even against 1000°F. What is more the CAPOSITE blocks and pipe sections can be applied to cold surfaces, with absolutely no mess! This saves you weeks of time, pounds of money. CAPOSITE is the thermal insulation material with not only the highest efficiency but also with the lowest annual charge.*



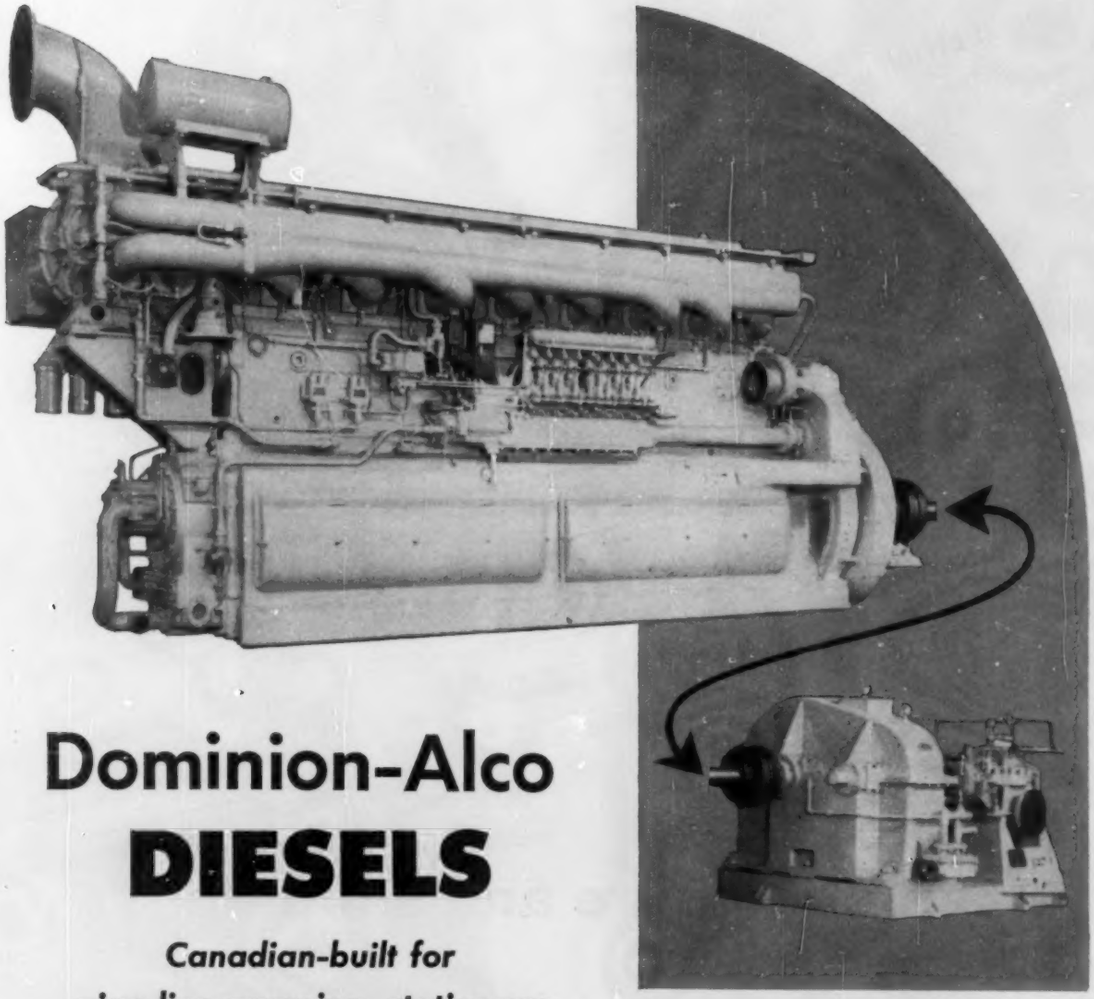
CAPOSITE REGD

Amosite Asbestos Blocks and Pipe Sections

**Annual heat loss value plus financial depreciation.*

CAPE

THE CAPE ASBESTOS COMPANY LTD., 114 & 116 Park Street, London, W.1. *GROsvenor 6022*
Canadian Enquiries: CAPE ASBESTOS (CANADA) LTD., 200 Bloor Street East, Toronto, Ontario.
United States Enquiries: NORTH AMERICAN ASBESTOS CORP., Board of Trade Building, Chicago 4, Illinois.



Dominion-Alco
DIESELS

Canadian-built for pipe line pumping, stationary or mobile power units

Ready to meet your power requirements, these dependable engines are products of over 23 years' experience in the construction of Diesels which have won an established reputation for reliability and economy. They are manufactured in a wide horsepower range, 500 H.P.-2400 H.P., suitable for operation on standard diesel fuels, natural gas or crude oil. They are completely built in Canada and spare parts are always readily accessible for efficient servicing. Choose "Dominion" for reliability and power in Diesels.

For complete information, write P.O. Box 220, Montreal

DOMINION ENGINEERING
COMPANY LIMITED
DIESEL DIVISION
MONTREAL · TORONTO · WINNIPEG · VANCOUVER

"DBM" MULTIPLEX BLOCKS
are preferred because...

HOOK, BLOCK and LINK ADAPTER are combined in one compact unit.

MULTI-PURPOSE HOOK DESIGN—both swivel and elevators can be supported simultaneously.

MAXIMUM COMPACTNESS—shortest unitized block made; also extremely narrow.

CONVENIENT WEIGHT ADJUSTMENT INTERNALLY—heavier or lighter by 20%.

ELEVEN SIZES with heavy duty bearings for high capacity.

For further information write P.O. Box 1348, Houston 1, Texas or see The Composite Catalog.

The "DBM" Multiplex is the clean-contoured block with a low center of gravity that gives it exceptional balance. The favorite where the going is toughest—on a portable rig demanding high capacity—plus compactness.

BAASH*ROSS
TOOL COMPANY
DIVISION OF JOY MANUFACTURING COMPANY

HOUSTON, TEXAS • ODESSA, TEXAS • LOS ANGELES, CALIFORNIA
OKLAHOMA CITY, OKLAHOMA • CANTON, OHIO • NEW YORK, NEW YORK
OLNEY, ILLINOIS • EDMONTON, ALBERTA, CANADA • MARACAIBO, VENEZUELA

London Letter

By E. Lawson Lomax

Official opening on October 17, by Queen Elizabeth, of Calder Hall (Cumberland), the world's first atomic power station to be brought into operation, marks the beginning of another chapter in the history of energy production and utilization following expanded consumption of petroleum for that purpose in the first half of the present century.

The new station ultimately will comprise two units, each with an annual capacity of 90 megawatts. Work on the first was commenced in August 1953 by London contractors Taylor Woodrow, who hope to complete the second by mid-1958 (now 75% complete).

Other contractors sharing in the erection of this plant are Costain-John Brown Ltd., Babcock & Wilcox Ltd., Whessoe Ltd., and C. A. Parsons & Co. Ltd., Newcastle-on-Tyne.

Shell Petroleum Co. Ltd., has conducted research at its Thornton Research Center for special lubricants for this plant. Subjected to an atomic reactor, and to the cobalt 60 source installed in the Thornton Lab., special lubricants have resulted, capable of withstanding high temperatures and intense atomic radiation.

United Kingdom Refinery Developments

Sir Leonard Sinclair, chairman and managing director of Esso Petroleum Co. Ltd., has announced company is now seeking "planning approval" for the industrial development of some 1,000 acres purchased in the Milford Haven area. It plans building a refinery, with annual crude capacity of five million tons, and developing a marine terminal for large-tonnage tanker berthing and discharging, with storage and ancillary facilities. Outcome of the company's long-term planning to cope with rapidly increasing United Kingdom oil consumption began . . . began with purchases of land about 18 months ago, before the Suez crisis; the plan is not related with any others at Milford Haven.

Erection of the plant (estimated to cost £20) awaits planning approval; thereupon construction should take about 2½ years.) With extensions now in hand at Fawley, this refinery will increase Esso's United Kingdom capacity to about 15½ million tons.

It is understood a new refinery, to be constructed near Southampton for Regent Oil Co. (owned by Caltex & Trinidad Oil), is to be erected on a site purchased some years ago. With an annual crude capacity of some 5 million tons, to cost about £25 million, it will considerably increase Regent's distribution capacity, enabling it to hold its own in the rapidly increasing United Kingdom market for petroleum products.

United Kingdom Petrochemical Developments

British Hydrocarbon Chemicals Ltd. (jointly owned by British Petroleum Co. Ltd. and the Distillers Co. Ltd.) has announced a plant for the production of 11,000 tons of Polyethylene to be erected at Grangemouth, Scotland. It will use a low-pressure process developed by Phillips Petroleum Co. Polyethylene has been processed for some time by high-pressure polymerization, but the patent expired the first of this year.

Besides Phillip's, another low-pressure process, the Ziegler was developed in Germany. Petrochemical Ltd., now owned by Shell, holds United Kingdom rights for this process and is erecting a 1,000-ton-per-year plant.

Forth Chemicals Ltd. (jointly owned by British Hydrocarbon Chemicals and Monsanto Chemicals Ltd.) have announced completion of the major expansion of their styrene monomer, now in operation. Initial capacity of the plant will be more than trebled, and will enable present requirements for styrene monomer to be supplied from United Kingdom plants without importation from the dollar area, as in the past.

The Distillers Co. Ltd. announced that British Geon Ltd., has begun erection of a plant at Barry, Glamorgan, to manufacture special-purpose synthetic rubbers. In this project Distillers are associated with B. F. Goodrich Chemical Co. of America. The new plant will manufacture Hycar butadiene-acrylonitrile copolymers and latexes usually known as nitrile rubbers. For many years these Hycar synthetic products were manufactured solely in the U.S.A. by Goodrich Co.; they were used first in the United Kingdom during the last war. Highly oil-resistant, these nitrile rubbers have excellent mechanical properties.

Shell-Mex B.P. Bridgewater Installation

This newest of Shell-Mex and BP's storage installations was opened formally, October 16, by Sir Gerald Wells for Bridgewater. It is a link in Shell-Mex and B.P.'s £10 million reconstruction program now being carried out at various United Kingdom coastline points which have been scientifically designed and laid out for quick and efficient large-scale throughputs of oil products, at lowest cost. Built at Dunball on the River Parrett, this installation will serve an area lying between Shaftesbury in Dorset; Porlock, North Somerset; and Sidmouth, South Devon. It will be serviced monthly by tankers of up to 780 dwt sailing from Llandarcy, Swansea, and berthing at the new 340-foot jetty. Shells "Steelmaker" took the first tanker load which, in addition to 450 tons of gas oil, carried letters of greeting from the mayor of Swansea to the mayor of Bridgewater and the chairman of Bridgewater Rural District Council.

Marine Survey Off United Kingdom Coast

The first water-borne geophysical survey by British Petroleum Co. Ltd., off the coast of Britain was conducted early in October, off Swanage and Lulworth Cove, from the 1,000-ton converted corvette "Seislim" owned by Seismograph Service Ltd., the first British-owned vessel especially equipped for this work.

The survey, which investigated the nature of underwater coastal rocks to depths of 10,000 feet, was part of the 21-year-old B.P. search for possible oil-bearing rock fomations in the Bitish Isles. Formations already have been found in the East Midlands from which oil is being produced.

Tanker Brings Middle East Crude to Australia

The largest tanker to berth in any Australian port is the 32,000 dwt B.P. "British Sailor," which recently discharged 28,500 tons of Middle East crude at Cockburn Sound, western Australia, ocean terminal for British Petroleum Co. Ltd.'s Kwininana oil refinery.

B. P. Tankers Ltd. to Build Larger Tankers

At the launching of the 32,000 dwt tanker "British Industry" at the Clydebank Shipyard of John Brown & Co., in Scotland, B.P. chairman Basil R. Jackson announced the company's next building program will include tankers of 60,000 dwt; that seven 42,000 dwt tankers already were on order which eventually could pass through the Suez fully loaded if proposed extensions and improvements of the Suez Canal Co. are carried out; and that, although Suez passage is not feasible for 60,000 dwt ships, these might service the company's Aden and Kwinana refineries where Suez transit is not involved or where passage around the Cape is possible.

The 21,500 dwt combined ore and oil carrier "Sova Pacific," built by Gotaverken, was delivered to its owners, Rederi A.B. Soya, on September 27, after successful sea tests.

The 32,000 dwt tanker "S.S. Alan Evelyn" built for British Oil Shipping Co. Ltd. (controlled by Charles Clore) was launched from Furness Shipbuilding Co.'s Haverton Hill Shipyard, October 22.

Tanker Rates Rise

All classes of tanker rates—including single and multiple-voyage as well as "period" rose sharply just before October 22; further rises are indicated.

Tankers Building

According to Lloyd's Register, 219 tankers currently under construction in world's shipyards, representing 30.2% of all shipping under construction.

The 38,000 dwt "Zenatia," built for Shell Tankers Ltd., was launched from the Birkenhead Shipyard of Cammell Laird & Co. Ltd., October 23.

Shell Tankers Ltd., announces the size of some of their crude-oil carriers currently under construction are to be enlarged—including nine of the fifteen 32,500 dwt ships ordered last year for 1958-60 delivery. Subject to negotiation with the builders, four will be 38,000-40,000 dwt; two, 46,000 dwt; and three, 60,000 dwt.

Shell Tankers N.V., Rotterdam, also are to increase the size of three of the seven crude-oil carriers currently being built for them—one to be 46,000 dwt, and the other two about 38,000 dwt.

British Trench Drills Ordered for Saudi Arabia

Climax Rock Drill and Engineering Works Ltd., have received substantial orders from Aramco for wagon drills and other equipment for use in Saudi Arabia—the first time an American-controlled oil company has purchased such drills in the United Kingdom. The contract calls for a first order of eight special twin-drill rigs, each consisting of a heavy U-shaped steel frame carrying two 4-inch Climax drifters. This rig will be used for pipeline trench blasting, drilling two holes at a time and being carried along the line of the trench by a tracked vehicle with side-arm. This new rig enables one man to do the work of 15-20 men with hand-held drills.

Company News

British Petroleum Co. Ltd. announced, October 25, 1956, an interim dividend on the ordinary issued stock of one shilling per £1 unit, free of income tax.

Shell Trinidad (formerly United British Oilfields of Trinidad) announces, in view of the proposed transfer of headquarters and control to Trinidad, it is paying a dividend of one shilling per six shillings and eightpence stock unit, free of tax, on the £1.5 million ordinary stock. A final dividend for the year will be determined by a new Board upon final accounting. The consent of the treasury has been obtained for the transfer of control from United Kingdom to Trinidad. The Esso £10 million 5½% debentures issued October 25, 1956, were oversubscribed by £30 million; subscription closed in 5 minutes.

Anglo-Ecuadorian Oilfields Ltd. announced a dividend of tenpence per ordinary stock unit of six shillings and eightpence to be paid December 11, 1956 to stockholders of record November 20.

Personnel

Owing to expansion in Esso's refining and development operations, a number of new appointments have been made:

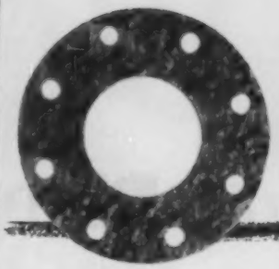
Refinery coordination group—J. BOWEN becomes assistant refinery manager responsible for accounting; employee, medical, and public relations. He joined AGWI Petroleum Corp. in 1939. R.H. ANBIGAULT, who joined Esso in 1946, succeeds Mr. Bowen as employee-relations superintendent.

Dr. D.F. JACQUES is now process superintendent. He joined the refinery in 1951. He is succeeded, as cost superintendent, by J.E.M. JEFFERS, who joined the company in 1947.

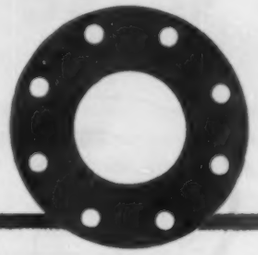
A.W. FORSTER, who joined the company in 1951, has been named refinery coordinator in the group recently established in the head office under Dr. A.W. Pearce, general manager of refining.

Development (Operations) Department—E. EVANS-JONES is to be the new manager, having joined the company in 1936 as senior engineer. G.A. VICKERS is manager of development engineering, having joined in 1924 as draughtsman. R.L. HILL becomes manager of budget control, who joined the company as sales-research statistician in 1949. J.F. BIDEN is manager of distribution planning, having joined AGWI Petroleum Co. in 1935.

Let's Klingerise our plant and stop all these breakdowns!



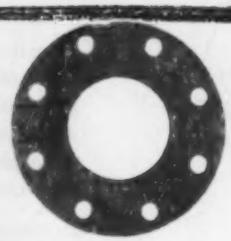
"KLINGERIT" The universal sheet packing for super-heated and saturated steam, acids, alkalis, and other chemicals, oils, spirits, solvents and hydrocarbons, hydraulic pressures, compressed air and other gases.



"KLINGER-OILIT" Primarily for use in the oil industry and suitable for trichlorethylene, carbon tetrachloride, naphtha and many other chemicals up to 900°F. Also for use with many refrigerants. It is made mainly from inorganic materials and is suitable for the highest temperatures and pressures.

"KLINGER-ACIDIT" For hot nitric, hydrochloric, sulphuric and all other organic and inorganic acids. It is not damaged by oils, gasoline and other solvents and has been tested to 500°C and 1,000 p.s.i.

"KLINGERIT-1000" Has as its base a tough close-mesh wire gauze in specially prepared asbestos compound, forming an extremely strong homogeneous jointing material. It is better able to resist blowing out than any other jointing, and is recommended for extremely high temperatures.



"RK" For most conditions of pressure and temperature encountered in general engineering practice. It is suitable for super-heated and saturated steam, water, compressed air and other gases and most chemicals.

Write to your Klinger agent for descriptive leaflets and literature.

Klinger
COMPRESSED
ASBESTOS SHEET PACKING
FOR EVERY PURPOSE

RICHARD KLINGER LIMITED, KLINGERIT WORKS, SIDCUP, KENT, ENGLAND
Cables: Klingerit — Agents throughout the world — Telephone: Foots Cray 7777
MANUFACTURERS OF KLINGER SEATLESS PISTON VALVES; KLINGER SLEEVE-PACKED COCKS; KLINGER LEVEL INDICATORS; RINGS AND SEALS IN KLINGER SYNTHETIC MATERIALS, AND KLINGERIT COMPRESSED ASBESTOS SHEET JOINTINGS AND PACKINGS FOR EVERY PURPOSE

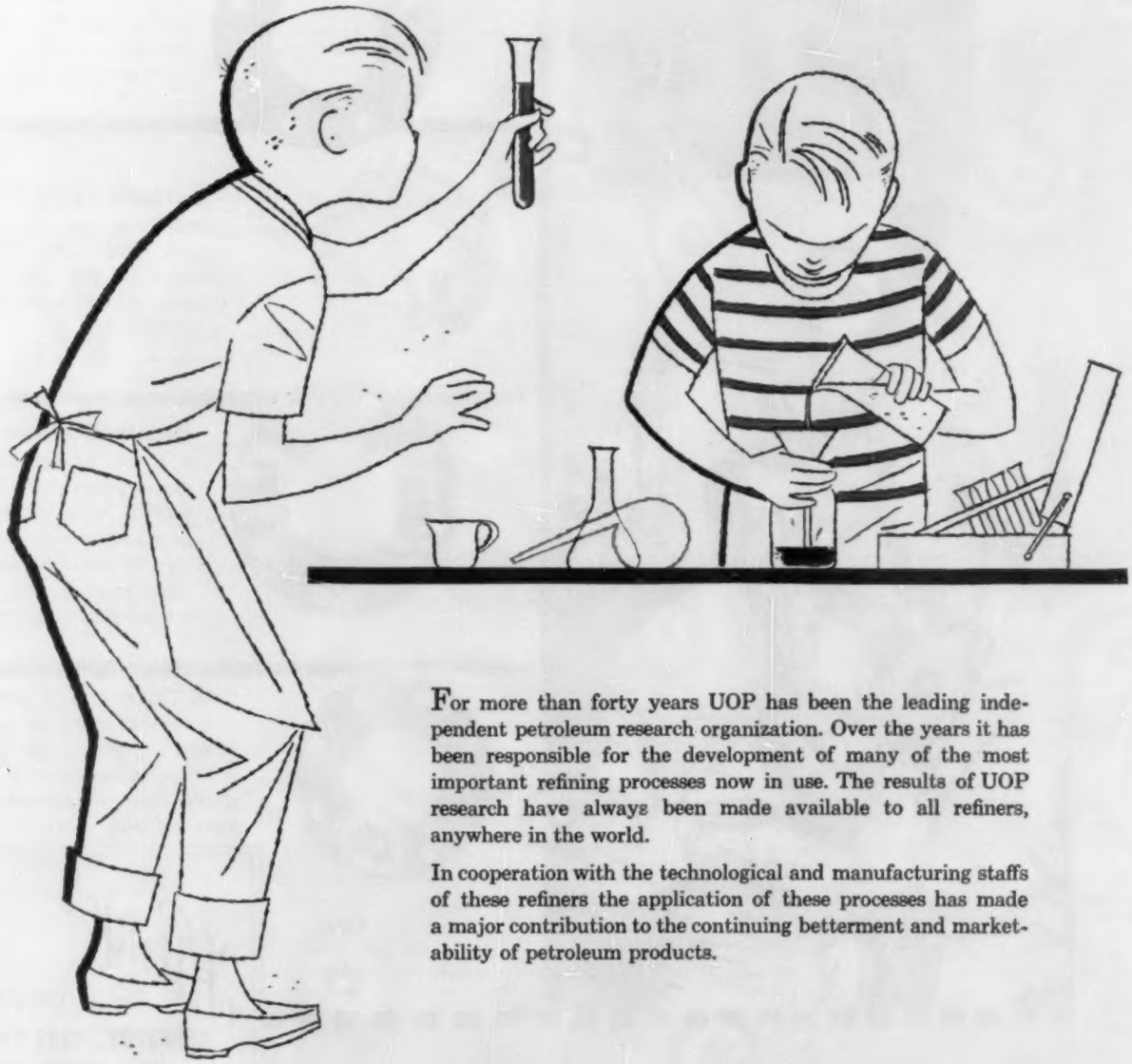
Manufacturing Licensees for Canada
JOSEPH ROBB & COMPANY, LIMITED
5575, COTE ST. PAUL ROAD, MONTREAL, 20, CANADA
Telephone: WILBANK 3181 — Cable: ROBCO
Branches at: SYDNEY, HALIFAX, OTTAWA, TORONTO, HAMILTON, WINNIPEG, EDMONTON, VANCOUVER, QUEBEC CITY.

Manufacturing Licensees for U.S.A.
THE KLINGER CORPORATION OF AMERICA
95, RIVER STREET, HOBOKEN, NEW JERSEY, U.S.A.
Telephone: HOBOKEN 2-7915 — Cable: KLINGDALE

Distributors and Agents in principal cities.

CI4/56/5J

Right from the start—



For more than forty years UOP has been the leading independent petroleum research organization. Over the years it has been responsible for the development of many of the most important refining processes now in use. The results of UOP research have always been made available to all refiners, anywhere in the world.

In cooperation with the technological and manufacturing staffs of these refiners the application of these processes has made a major contribution to the continuing betterment and marketability of petroleum products.

Forty Years Of Leadership In Petroleum Refining Technology

Research is working to make petroleum products better

Throughout the great petroleum industry there are thousands of scientists, technicians, engineers devoting their efforts exclusively to research. Their efforts range from the development of an abstract theory in the laboratory to the practical application of it in the field or at the refinery.

Yet, right from the start, most everything that is done in petroleum research concentrates on the development of improved products from petroleum, products better fitted to answer the demand of today's economy, products that fill as well as anticipate the growing public need.

Research, too, is devoted to the task of helping the refining industry get the most out of every barrel of crude that is processed in its plants. This makes possible the economical manufacture of petroleum products and their availability to the broadest markets at reasonable prices.

We have a lot of these men of science here at Universal, and there are lots more on the research staffs of refiners everywhere. It is good to know that their efforts are concentrated on the continual improvement of petroleum products, a satisfying assurance that the oil industry will continue to fulfill its responsibilities.

UOP

UNIVERSAL OIL PRODUCTS COMPANY

30 ALGONQUIN ROAD, DES PLAINES, ILLINOIS, U.S.A.

Oil Company Staff Changes

K. M. Sebastian

C. W. Nave

C. W. NAVE, general manager of the Atlantic Refining Co. of Brazil for the past thirty years, retired October 31. He was succeeded by R. M. Sebastian, who has been serving as assistant general manager in Brazil since April, 1955.

Mr. Nave began his career with Atlantic in 1921 at the company's Philadelphia refinery. Later that same year he was sent to Brazil as a special marketing representative and in 1927 was appointed general manager and elected to the Board of the Atlantic Refining Co. of Brazil. Under his able leadership the company has grown into a major concern, presently employing 2,000 persons, with distribution facilities in all of Brazil. During the latter years of his residence in Rio de Janeiro, Mr. Nave, as senior manager of the petroleum companies operating in Brazil, has had the additional responsibility of heading up joint company negotiations with the government. In this capacity he performed an outstanding job for all of the oil in that country.

A graduate of the Law School of the University of Pennsylvania, Mr. Sebastian joined Atlantic's legal department in 1944 and from 1945 to 1949 served as resident counsel in Caracas for the company's crude producing subsidiary, the Venezuelan Atlantic Refining Co. During the six years prior to his appointment as assistant general manager in Brazil, Mr. Sebasian was a senior attorney at the company's Philadelphia headquarters.

T. M. KERR, formerly executive vice president of Kerr-McGee Oil Industries, Inc., has been elected vice chairman of the board of directors. F. C. Love, formerly general vice president, became executive vice president. A. T. F. Sale, formerly vice president of manufacturing, became vice president of operation. W. M. Murray has been named vice president of general sales, R. M. Chesney vice president of refining, and J. W. Roach vice president of crude oil supply, pipelines, and refinery technical services. The three were vice president of Deep Rock Oil Co. before its absorption as a division of Kerr-McGee. G. B. Parks, formerly manager of production and drilling operations, has been elected vice president of production and drilling operations.

Harry L. Conner

George D. Comnas

GEORGE D. COMNAS and **HARRY L. CONNER** have been elected vice presidents of Esso Export Corp., international marketing affiliate of Standard Oil Co. (N.J.), has been announced. Mr. Comnas will head the new crude and product sales department recently established by Esso Export and Mr. Conner will continue as comptroller of Esso Export.

G. A. STEIN, JR., for many years with the Esso refinery in Baton Rouge, has been elected managing director of Esso Standary Refinery S.A. in Belgium. Mr. Stein started with Standard Oil Co. (N.J.) organization in 1927 and, following work as technical adviser to that company's affiliate in Denmark, returned to the United States to supervise operations of pilot plants and hydrogenation and catalytic cracking units at Baton Rouge. From 1942 to 1954 he was in charge of synthetic rubber plants and chemical products. He went to Antwerp in 1955 after assisting with the start-up of Fluid hydroforming equipment in Venezuela.

Colonel **MARIO POPPE DE FIGUEIREDO** has succeeded Dr. **ADROALDO JUNQUEIRA AYRES** as president of The National Petroleum Council in Brazil.

WILLIAM HUMPHREY, for several years Mexican representative of the De Golyer, MacNaughton Geophysical Co. in Mexico, has been transferred to Spain, where he will occupy a similar post.

HERBERT KENT WARD, under contract to Petrobras since June 1, was killed by falling trees at Abacaxis during a storm on September 30.

C. N. BROOKS has been appointed general manager of The Texas Co., foreign operations department, Eastern Hemisphere. Mr. Brooks. who has been manager of the Southern Territory, domestic sales department at Houston, since 1953, succeeds Harvey Cash, who was recently named assistant to the chairman of the board.

BRUCE K. BROWN has been elected president and chief executive officer of Petroleum Chemicals, Inc.

Mr. Brown was former deputy administrator of the Petroleum Administration for Defense and, until recently, president of Pan-Am Southern Corporation. Petroleum Chemicals, Inc., jointly owned by Cities Service Co. and Continental Oil Co., has headquarters in New Orleans. At the meeting of the Co.'s directors, W. Alton Jones. chairman of Cities Service Co., and L. F. McCollum, president of Continental Oil Co., resigned as chairman and president respectively of Petroleum Chemicals, Inc., thus placing Mr. Brown in the position of chief executive officer.

FRED G. CROSBY has been appointed general sales manager of Sun Oil Co., Ltd. Mr. Crosby was formerly assistant to the managing director. He began his career with Sun Oil Co., Ltd., Canadian subsidiary of Sun Oil Co., Philadelphia, in 1931 as a motor products salesman at Toronto

T. R. CORBETT, a former manager of The Carter Oil Co. refinery in Billings, Montana, has been elected managing director of Esso Nederland N. V. in charge of refining activities in the Netherlands. For the past five years he has been managing director of Esso Standard Refinery S.A. in Antwerp, Belgium. Esso Netherland, an affiliate of Standard Oil Co. (N.J.), is starting construction of a new refinery in Rotterdam with a capacity of 40,000 b/d. The plant is scheduled to begin operation early in 1960.

MARTIN JONES, a member of the board of Creole Petroleum Co., has been transferred to Standard Oil Co. (N.J.), where he is to become assistant governmental relations counselor about November 1.

HARVEY CASH has been appointed assistant to Augustus C. Long, chairman of the board of The Texas Co. Mr. Cash has been general manager of Texaco's foreign operations department—Eastern Hemisphere since April, 1954.

Thomas E. Monaghan

THOMAS E. MONAGHAN, now associate general counsel for the Standard Oil Co. (N.J.), with extensive experience in international law, will become general counsel effective Nov. 1. He succeeds E. F. Johnson, who is retiring Oct. 31 on completion of 30 years' service to resume the general practice of law.

A native New Yorker, Mr. Monaghan joined Jersey Standard in 1946 after serving as counsel for Pan American Petroleum Transport Co. and as a director of the American Oil Co. and Mexican Petroleum Corp. He is a member of the American Bar Association and of The Association of the Bar of the city of New York. Mr. Johnson joined Standard Oil Co (N.J.) in 1926. He was appointed general attorney in 1941, and general counsel Jan. 1, 1945.

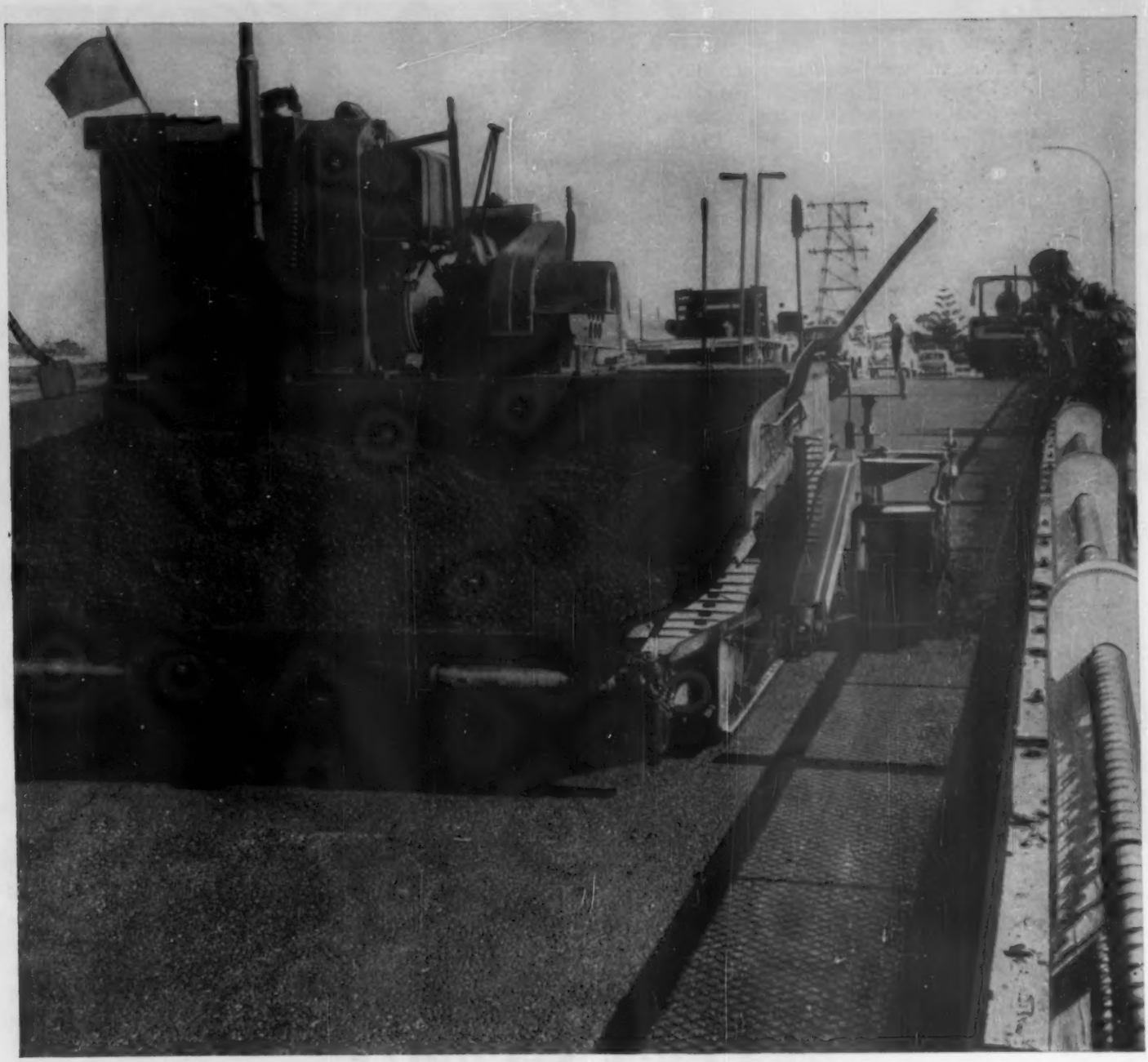
George T. Naff

GEORGE T. NAFF, president of Texas Eastern Transmission Corp. has been elected vice chairman of the board. Orville S. Carpenter, vice president and comptroller, was named president and a member of the board of directors.

JOHN L. REDMOND, geologist in the Ohio Oil Co.'s Calgary (Alta., Canada) Production District, has been transferred to the company's subsidiary in Libya. North Africa, the Oasis Oil Co. of Libya.

A. B. MACAULAY has been appointed assistant to the vice president and general manager of The Atlantic Refining Co.'s crude oil production department. Succeeding Mr. Macaulay as manager of Atlantic's domestic production administrative division is Clarence E. Cardwell, Jr.

A graduate of Southern Methodist University, Mr. Macaulay came with Atlantic in 1934 in the accounting department. He later served as assistant supervisor of the valuation division, was administrative co-ordinator of the company's domestic production department and, since 1954, has been manager of the administrative division.



BP PAVES THE WAY

THE BP sign is a symbol of service to road users in many parts of the world.

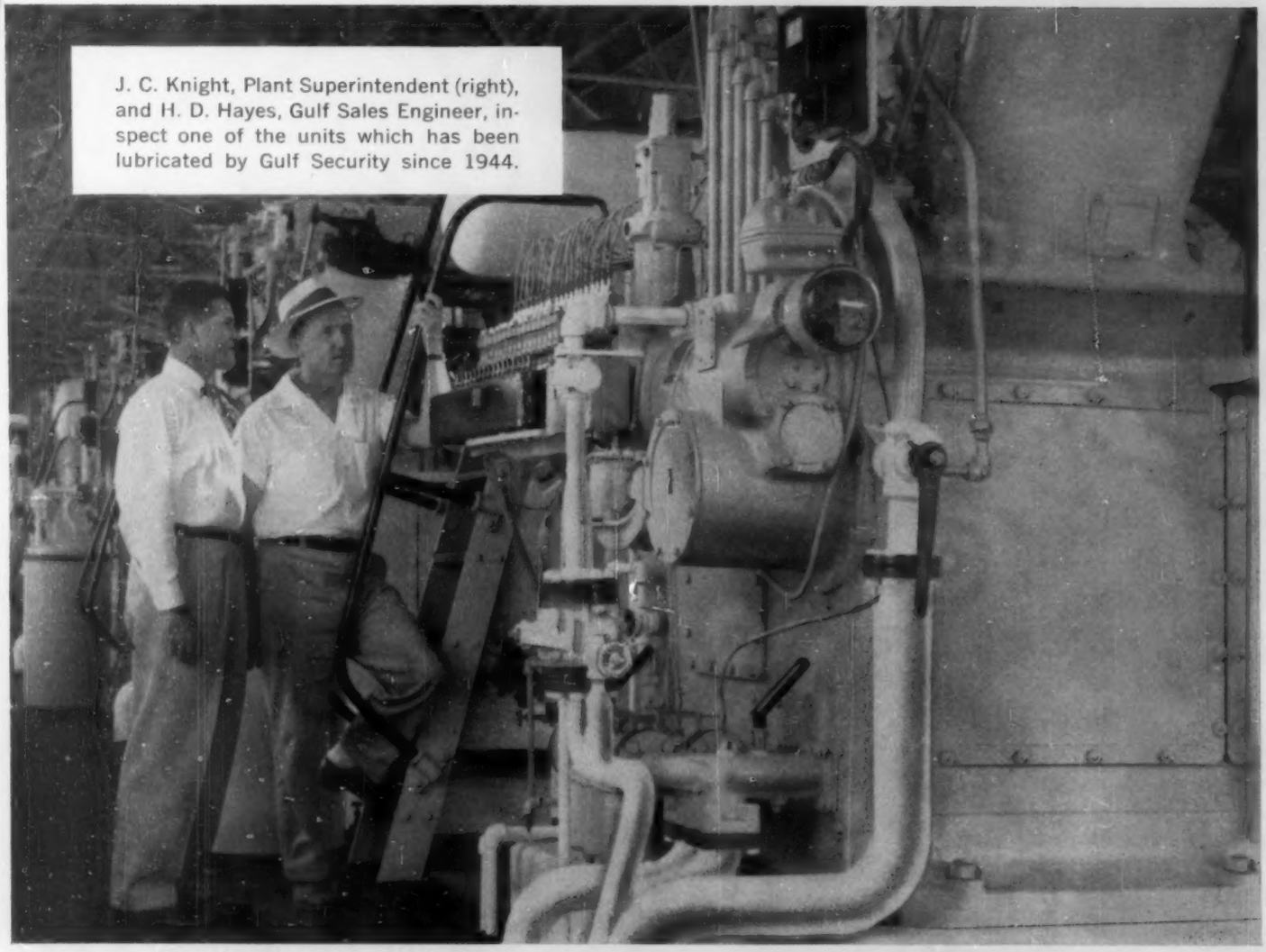
The BP range of motor fuels and lubricants is by no means the only contribution of The British Petroleum Company to better motoring. Good roads are at least as important as good petrol and oil. And good roads, like good petrol and oil, are The British Petroleum Company's concern.

Bitumen for road-making is one of the many BP products that are speeding progress all over the world.

The BP Shield is the symbol of the world-wide organisation of

The British Petroleum Company Limited

BRITANNIC HOUSE · FINSBURY CIRCUS · LONDON, E.C.2.



J. C. Knight, Plant Superintendent (right), and H. D. Hayes, Gulf Sales Engineer, inspect one of the units which has been lubricated by Gulf Security since 1944.

At Lobelville Station of Tennessee Gas Transmission Company

12 years of dependable compressor service with GULF SECURITY

With engines totalling 37,500 hp, the Lobelville, Tennesee, station of Tennessee Gas Transmission Company is one of the largest compressor stations in the United States. This station has been lubricated by Gulf Security for the past 12 years.

Gulf Security is a non-additive oil that protects compressor and power assembly cylinders and piston rings against harmful deposits and excessive wear. Like Tennessee Gas Transmission Company's Lobelville station, scores of other transmission plants all over the country are using Gulf Security to prevent operating troubles and keep maintenance costs down.

The Gulf complete "package" includes not only the finest petroleum products and prompt delivery, but also the services of an experienced petroleum engineer to help you with *any* problem that involves a petroleum product. Why not find out if Gulf can be of service to *you?* Your Gulf representative is as near as your telephone.

GULF OIL CORPORATION
GULF REFINING COMPANY
1822 Gulf Building
Pittsburgh 30, Pennsylvania

GULF

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

NEW 4X4 INTERNATIONAL S-LINE

S-120 7000 lbs. GVW. Light-duty, multi-purpose, farm, industry or business truck. Choice of 3 pickups and 2 stake bodies, with Black Diamond 240 high-compression engine.

. . . all-wheel drive for all working conditions!

These new 4-wheel drive Internationals work anywhere. On steep or level grades. On hard-surfaced roads, in mud, sand, snow or loose gravel.

Special shift lever disengages front axle for conventional 4x2 highway travel. Combined with 2-speed transfer case, 3 or 4-speed transmissions deliver 6 or 8 forward speeds and 2 reverse. Comfortable, full-vision cab assures easiest driving and handling of any 4x4.

International 4x4 trucks are available in choice of engines, body styles and tire sizes (for extra lift and traction). Exclusive IH power take-off transfer case, plus optional transmission power take-off provides for auxiliary equipment operation. Optional over-size rear axle for S-140 and S-160.

S-140 11,000 lbs. GVW. Medium-duty truck with Black Diamond high compression, I-block, short stroke engine. Wide selection of factory-mounted equipment and bodies for every 4x4 use.

S-160 15,000 lbs. GVW. Medium-duty model with heavy-duty performance. Has thrifty BD 264 engine. Full line of bodies, equipment and power take-off attachments available from factory.

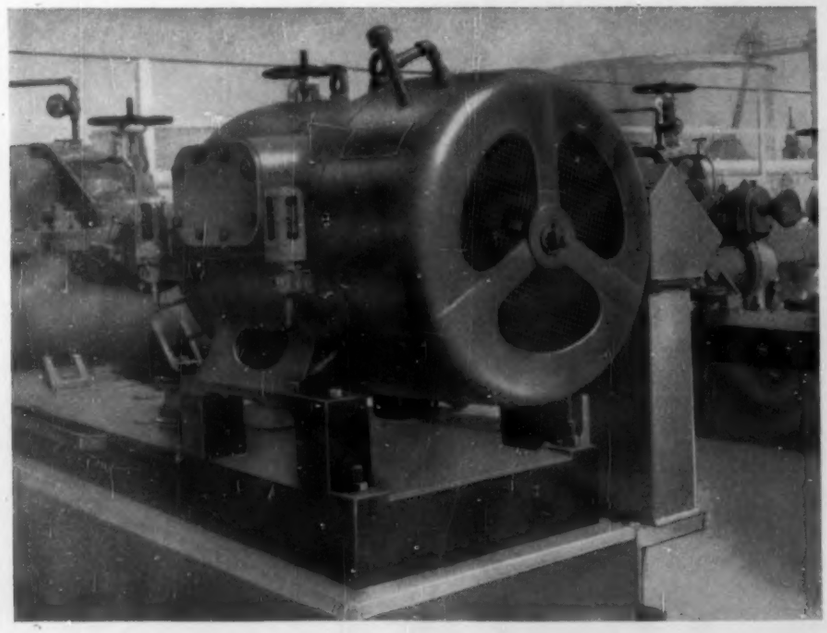
As in all International trucks, every part is engineered and built *only* for truck operation—for severe truck use under full truck loads. Talk to your International dealer about the 4x4 model you need or write for free catalog.

INTERNATIONAL TRUCKS

Standard of the highway!

INTERNATIONAL HARVESTER EXPORT CO., CHICAGO 1, ILLINOIS, U.S.A.

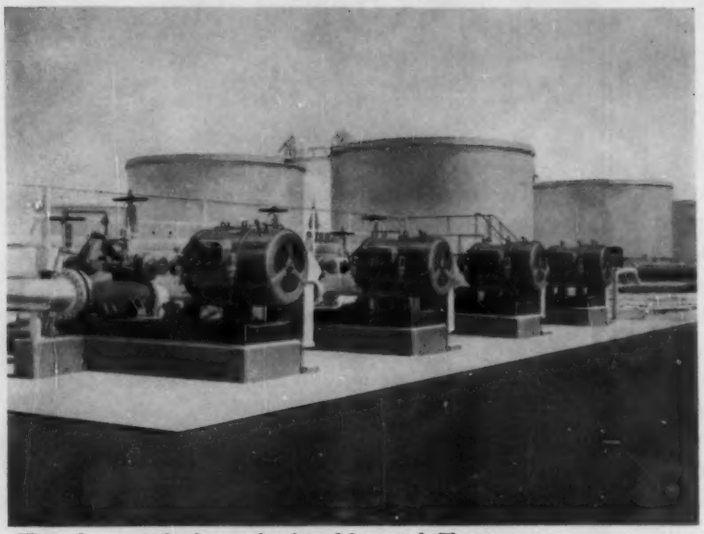
Flameproof Motors for the Oil Industry



A Metrovick 250 h. p. 1480 r. p. m. Flameproof Squirrel Cage Motor—one of four supplied to the Kwinana Oil Refinery.

Oil wells and refineries throughout the world rely on M-V equipment. Metrovick experience of motors and their proper application covers all drives in the oil industry, from drilling to refining. Some of the refineries using Metrovick motors are the Grangemouth Petroleum Refinery, Ltd., Shell Stanlow Refinery, Esso Refinery, Fawley, Trinidad Leaseholds Point-a-Pierre Refinery, B. W. I., and (illustrated) British Petroleum Company's Refinery at Kwinana, Australia.

Special arrangements were put in hand to guarantee that these motors were delivered to meet site requirements.



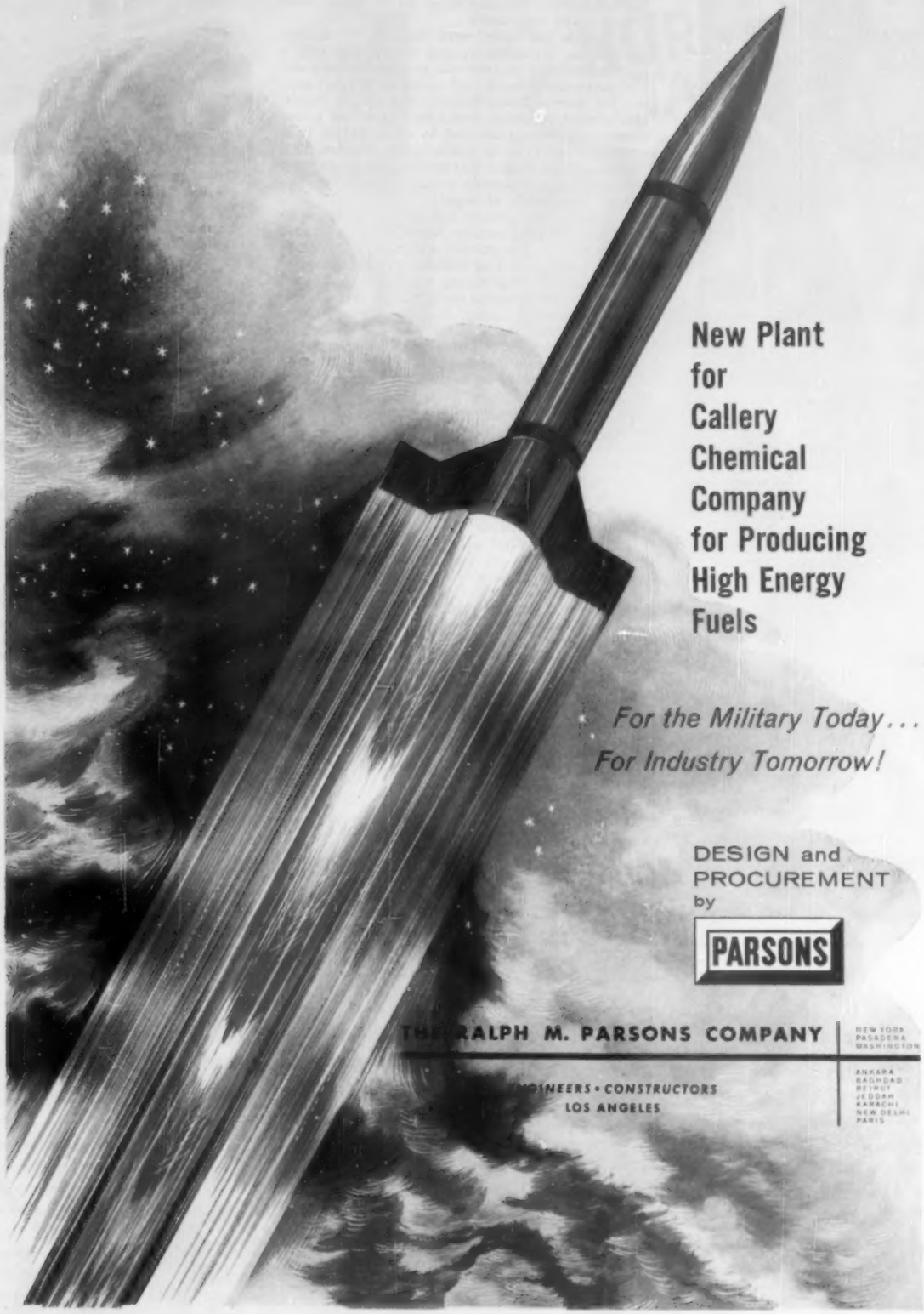
This photograph shows the four Metrovick Flameproof Motors driving kerosene pumps at Tank Farm Pumping Station No. 3. These motors are fitted with constant-level oil lubricators.

METROPOLITAN-VICKERS

ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

Member of the A. E. I. group of companies

J/0501


New Plant
for
Callery
Chemical
Company
for Producing
High Energy
Fuels
For the Military Today...
For Industry Tomorrow!
DESIGN and
PROCUREMENT
by
PARSONS
THE RALPH M. PARSONS COMPANY
NEW YORK
PASADENA
WASHINGTON
ANKARA
BAGHDAD
BEIRUT
JEDDAH
KARACHI
NEW DELHI
PARIS
ENGINEERS • CONSTRUCTORS
LOS ANGELES

Desk and Derrick Club Elects Officers

The Desk and Derrick Club of Houston elected its officers and directors at the regular monthly meeting Thursday, August 9.

Taking office as president for the coming year will be Mrs. Ida Brigham Griffith of Humble Oil & Refining Co. Other officers are Miss Louise Sherrill of Brewster-Bartle Drilling Co. as first vice president; Miss Anna Bob Taylor of Gulf Oil Corp., second vice president; Miss Alice Newcomer of Shell Oil Co., recording secretary; Mrs. Carol Beckwith of Cities Service Oil Co., corresponding secretary; Mrs. Olivia May of Humble Oil & Refining Co., treasurer.

Newly elected board members for the club are Miss Sophie Edmundson, Miss Janet Rother, Miss Kittie Skelton, and Miss Mary Woolford.

Miss Gladys Watford, outgoing president, will serve as board advisor.

International News and Notes

(*Continued from page 62*)

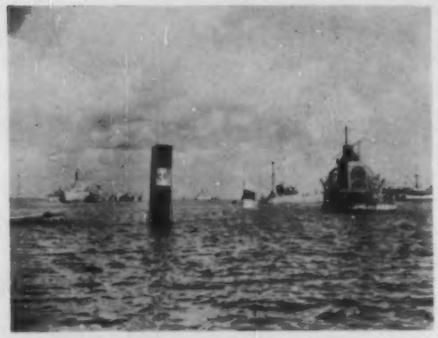
fourth of her oil consumption, valued at $9 million yearly, would no longer be fulfilled when the Israeli tanker "Yamsuf" sent word from Odessa that Soviet authorities had refused to load her. Previously the Yamsuf had been hauling about 225,000 barrels from Odessa every two weeks.

In Britain the government imposed a 10% curb on gasoline immediately, and followed it with a warning that the 10% cut was only preliminary and that particularly diesel fuel would be in short supply. Mr. Aubrey Jones, Minister of Fuel and Power, also advised industries which had converted power generating plants from coal to oil to switch back again if they could, as a temporary measure. This emphasizes the danger that oil's progression in Europe may be permanently damaged by the demonstrated uncertainty of supply.

In France regulations impose heavy fines on motorists straying outside limits of travel zones defined by the government, including fines up to $514 and withdrawal of licenses or confiscation of the automobile. The Swiss, too, have imposed a ban on private motoring on Sundays, and will introduce rationing during December. The Scandinavian countries are hard hit with a 25% curb on supply contemplated in Denmark and similar measures introduced in Sweden and Norway.

The U. S. government hesitated to reactivate the Middle East Emergency Committee, composed of members of the larger oil companies, which coordinates European efforts to obtain oil in the Western Hemisphere. The government felt that its cooperation in obtaining oil was a good lever to enforce compliance by England and France with United Nations' demand that they move out of Egypt and be replaced by UN troops. Bids, meanwhile, were entered by European firms to U. S. suppliers on the Gulf coast, and have skyrocketed tanker rates, one of the effects which Anglo-American cooperation on a government level might have minimized.

The London Emergency Committee, which is the European opposite number of MEEC, includes representatives of British Petroleum, Shell group, and the Cie. Française des Pétroles. The three countries represented by these companies control some 11 million dwt of West Europe's 23-million-dwt tanker fleet. This is more than a quarter of world capacity.



One of nearly 50 sunken ships projects above water in the Suez Canal.

Tanker rates during mid-November went as high as base rate plus 350% for a one-voyage trip by a 18,000-dwt tanker, the "Bellami," carrying dirty cargo from the Persian Gulf to the Atlantic via the Cape of Good Hope. USMC plus 200 was quoted for the American Flag tanker "Washington," of 15,000 dwt, carrying clean cargo on a one-voyage trip from the U. S. Gulf to Rotterdam.

Jersey Standard Acquires Chicago Affiliate

Standard Oil Co. (N.J.) has acquired two marketing organizations in the Chicago area, South Side Petroleum and the Perfect Power Corp., together with their affiliates. The transaction covers 77 retail service stations of South Side Petroleum, which markets gasoline under the Oklahoma brand, and 47 stations of Perfect Power, which retails Perfect Power products. Jersey Standard's new affiliates plan to continue their operations in their present forms under their present names and with their current operating personnel.

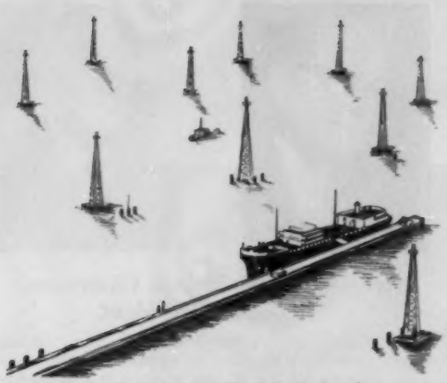
H.R.C. Cartridge Fuse Links

to B.S.S. 88-1952

A.S.T.A. certified for Category of Duty 550
A.C5 (46,000 amperes prospective current
at 550 volts.)

G.E.C.

THE GENERAL ELECTRIC CO. LTD., OF ENGLAND.



IN VENEZUELA . . .

As In Other Oil-Rich Free-World Countries

The GEOLOGRAPH RECORDER

Shows *Where* to Look for Oil!

Yes, Geolograph — the original mechanical well logger — is now in use in oil fields throughout the world. Geolograph's policy of continuous research, both in the factory and field, maintains it as the **most rugged and versatile** well logging instrument available for use **while the well is drilling.**

NOW AVAILABLE FOR EXPORT SALE
(except in Canada)

Geolograph's exclusive "TRIP ACTION" records any down time which occurs while a round trip is being made!

THE GEOLOGRAPH COMPANY

MANUFACTURERS • EXPORTERS

27 N.E. 27TH • P.O. BOX 1291 • OKLAHOMA CITY 1, OKLA.

ORDERS

are now being accepted for:

WORLD PETROLEUM REPORT 1957

A review of the world's oil industry in major countries, including over 60 separate national reviews. All aspects of interest to oil men are covered, beginning with exploration and progressing through marketing. Taxation, geography, corporate requirements for ownership, and other factors affecting investment are included. Copies may be ordered at $5 each through

WORLD PETROLEUM, 604 FIFTH AVENUE, NEW YORK 20, N. Y.

You can depend on HURST-NELSON TANK CARS

We design and build Tank Cars to meet variations in the factors of volatility, viscosity and all other properties of the liquids to be transported; we fit them also to suit all types of terminal loading and discharging facilities at installations. Our service can meet your precise requirements.

We invite your enquiries.

HURST-NELSON & CO LTD

Designers & Builders of Railway Rolling Stock

HURST, NELSON & CO. LTD., MOTHERWELL, SCOTLAND

Telephone Motherwell 500. Telegrams 'Nelson' Motherwell.

London Office: 30 Ashley Place, London, S.W.1. Tel. Tate Gallery 0404.

Oil-Well Supplies, a Billion-Dollar Business

Census Bureau reports the oil-well supply business is nearing a billion dollars annually. By 1954 the number of firms had climbed to 1,208, with annual sales of $914,479,000 from 1,005 firms and sales of $717,069,000 in 1948. In 1929 supply houses numbered 764, with sales of $228,710,000.

New Badger Appointments

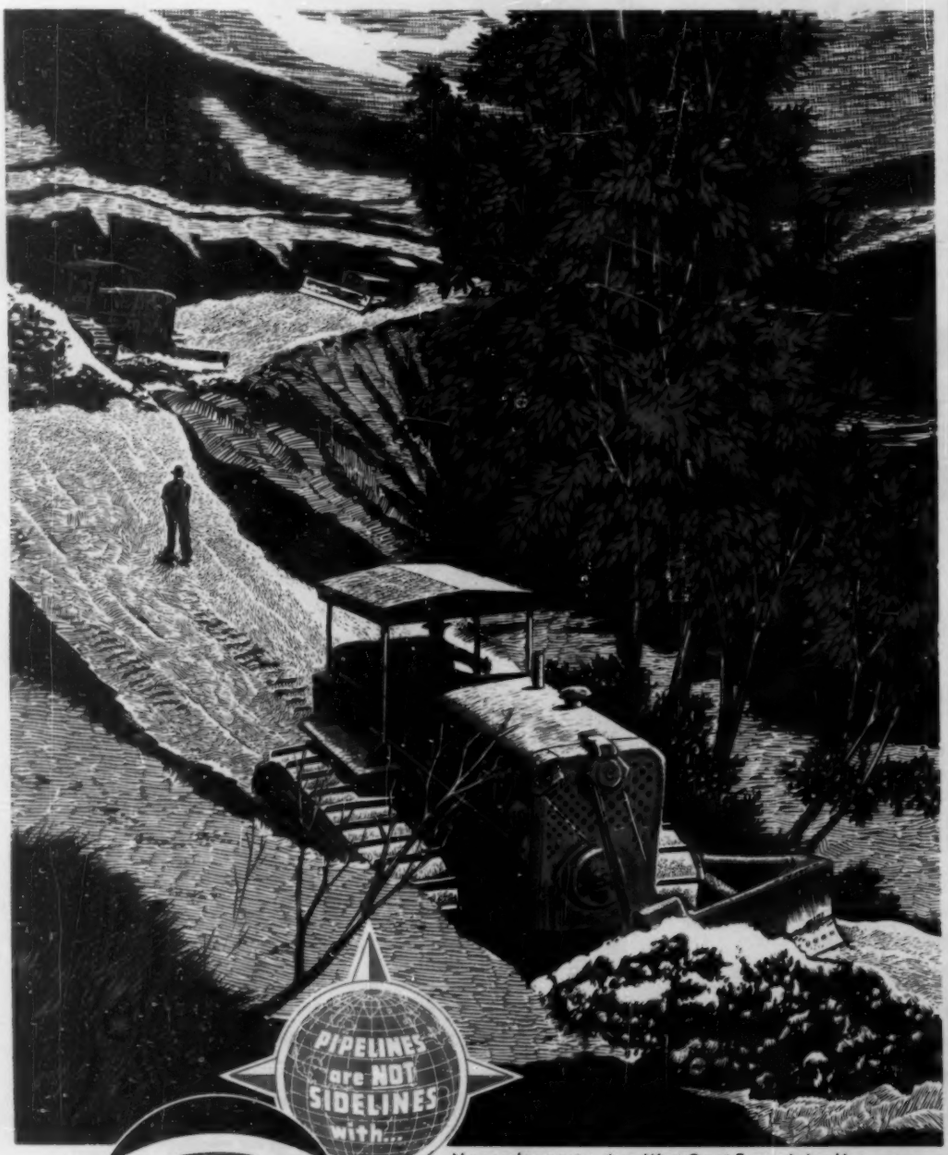
A. W. Pratt, formerly process-division chief engineer of Stone & Webster Engineering Corp., in Boston, Mass., has been appointed engineering manager of E. B. Badger & Sons, Ltd., S&W affiliate in London. He is succeeded by T. E. Casselman, as acting chief chemical engineer. Dr. R. L. Geddes, and W. E. Swiger are consulting engineers.

Procon to Erect Cat Cracker at Great Falls

Procon Inc., Des Plaines, Ill., has been named by Phillips Petroleum Co. as contractor for construction of a fluid catalytic cracking unit at its Great Falls, Mont. refinery. The unit is planned to handle 3,000 barrels of combined feed per day. Construction field work was to begin in November, with completion of the project scheduled for spring.

Engineers to Conduct Research

The Fluor Corp. has announced it intends to engage in contract research for the petroleum, chemical, and petrochemical industries for the first time in its 66-year history. This is a new departure for engineering-construction firms, this type of research in the past having been conducted by organizations devoted exclusively to research.



Now under construction: West Coast Transmission Line

WILLIAMS BROTHERS

ENGINEERS and CONSTRUCTORS

HBT BLDG. • TULSA, OKLAHOMA • CABLE ADDRESS: WILLBROS

New York • Washington • Louisville • Minneapolis • New Orleans

CANADA • BOLIVIA • COLOMBIA • ECUADOR

VENEZUELA • ENGLAND

OIL • GAS • WATER • PRODUCTS PIPELINES • PUMPING STATIONS

Dresser Names Mallon Chairman, O'Connor President

The board of Dresser Industries, Inc., Dallas, Texas, a leading supplier of equipment and technical services for the oil, gas, electronic and chemical industries has named H. N. Mallon to the newly-created position of chairman of the board. He will remain as chief executive officer. J. B. O'Connor, formerly executive vice-president, succeeds Mr. Mallon as president.

Dresser's sales have risen from approximately $5 million in 1955 to $230 million in 1956. Mr. Mallon has been principally responsible for developing and carrying out Dresser's program of growth and diversification. Mr. O'Connor, with Dresser since 1937, has assumed particular responsibility for Dresser's aggressive engineering and sales efforts on a world-wide basis. Mr. O'Connor also has been responsible for developing Dresser's export business to the point where it now accounts for more than 20% of the company's sales.

Mr. O'Connor was born in 1898 in Augusta, Georgia. He became general sales manager of Clark Bros. Co., of Olean New York in 1926 and vice president in 1935. Dresser Industries, Inc. was formed in 1938 by a merger between Clark Bros. and Dresser Manufacturing Co. and Mr. O'Connor was made executive vice-president of the new firm which now includes 11 operating companies.

He is a member of the board of Dresser Industries, president of Bovaird & Seyfang Co.; president of Ideco; chairman of Magnet Cove Barium Corp.; president of Security Engineering Co. of Canada Ltd., and member of the board of nine other companies. He is the world's most travelled executive and has been in practically every country of the world, including Siberia. He was the first to use the high-speed engine driven angle compressor for oil field service replacing the old slow speed horizontal units. He was one of the leaders in the repressuring of high pressure gas and distillate fields and built the first complete gas liquifaction plant in Russia. He is now busy pushing the gas turbine for pipe line and industrial use and the new Turbodrill.

Mr. Mallon was born January 1, 1895 in Cincinnati, Ohio. He joined U. S. Can Co., 1920 as factory worker, rose successively to president and general manager, S.R. Dresser Manufacturing Co., predecessor company of Dresser Industries, Inc. He is chairman of Bovaird & Seyfang Manufacturing Company, Dresser Equipment Co., Dresser Operations, Inc. and a director of 25 other companies.

Government Tanker Proposal Reviewed

A U.S. proposal for more tankers, now under study, is drawing a number of questions from U.S. oil men. The proposal, as under study, is for at least 50 tankers of 45,000 dwt, and larger, to insure free-world oil even if the Suez Canal is closed.

The U.S. claims it has authority under existing law to place orders with shipyards to build the tankers, and to buy the tankers on its own if private industry does not offer to do so.

Among the problems, oil men say, are these: It would take years to put the tankers at sea. Shipyards are busy, and only a few U.S. yards are able to handle ships of this size. Once afloat, the ships will find only a limited number of ports for berthing. For instance, a 45,000-ton tanker must lighten south of Philadelphia to reach Marcus Hook. And the tankers might be used at part capacity to be able to use some ports. Further, new tankers would hurt the market for existing ones.

The proposed program came to light with a memorandum from President Eisenhower to Dr. Arthur S. Flemming, defense mobilizer. On instructions in the memo, Dr. Flemming called some 16 members of the National Petroleum Council to a meeting about it, October 19.

BELL MODEL 47G

OIL MAN *in a hurry*

HELICOPTER OR BOAT . . .
FIFTEEN MINUTES OR TWO HOURS?

Magnolia Petroleum Company answers its own offshore transportation problem with a Bell Model 47G helicopter. Magnolia considers this versatile aircraft an indispensable time saver...ferrying executives and supervisory personnel, keeping its costly offshore operation moving, saving 105 minutes from the time it formerly took to make the trip by boat . . . and it's a morale builder, too. Workers know it's only a matter of minutes by helicopter from rig to shore in an emergency.

With float landing gear, the Bell helicopter lands anywhere, in any climate, in severe weather. Lowest in initial cost and maintenance the Bell helicopter is backed by more than two million hours of flight experience throughout the world.

For the complete story of Bell economy and reliability, write, wire or phone:

Outstanding job opportunities for qualified engineers.

BELL Aircraft corp.

Sales Mgr., Dept. WP
P. O. BOX 482
FORT WORTH, TEXAS

Speedier turn round at:—
Right : Aden Refinery.

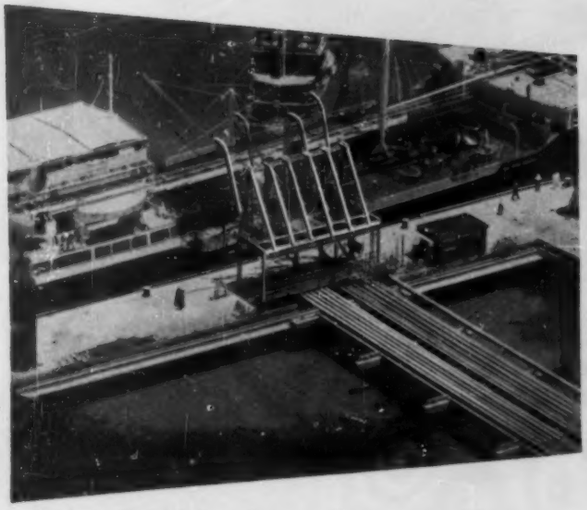
Below right : Kent Oil Refinery, Isle of Grain.

Bottom : Kwinana Refinery, Australia.

WOODFIELD

HOSE HANDLING *Equipment*

Saves Hose Costs, Labour and Demurrage charges, at many of the World's Refineries, Oil Storage Depots and Docks



10922

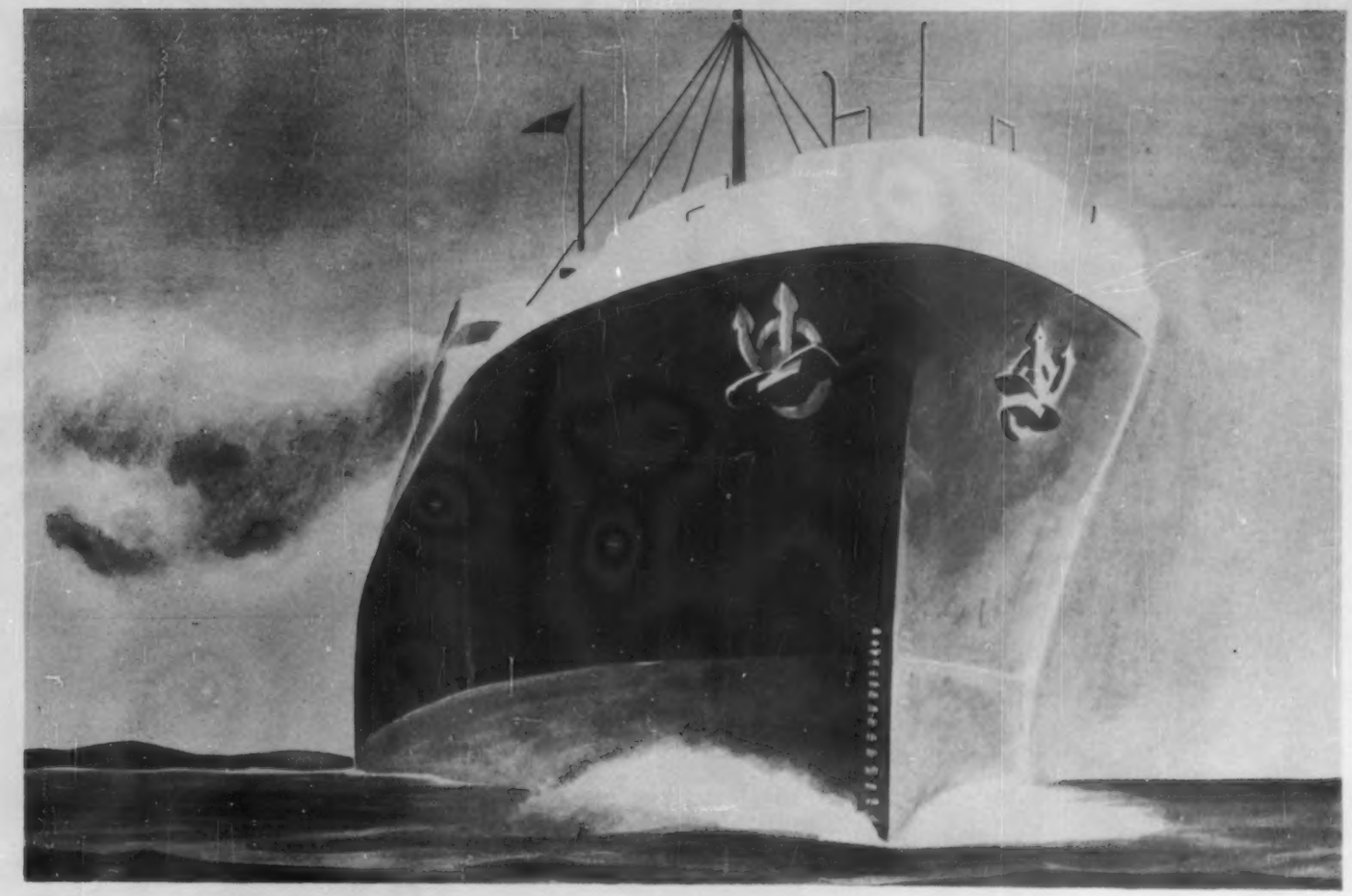
WOODFIELD HOIST
AND ASSOCIATED INDUSTRIES LIMITED

FRINDSBURY WORKS · ROCHESTER · KENT

Telephone: STROOD 78421 (5 lines) Telegrams: WOODFIELD TELEX ROCHESTER
TELEX: 26-2117 WOODFIELDSTROOD

LONDON OFFICE: 147, Victoria Street, S.W.1.
Telephone: TATe Gallery 4135 (3 lines)

Incorporating the Kemworthy jig & Press Tool Company · London

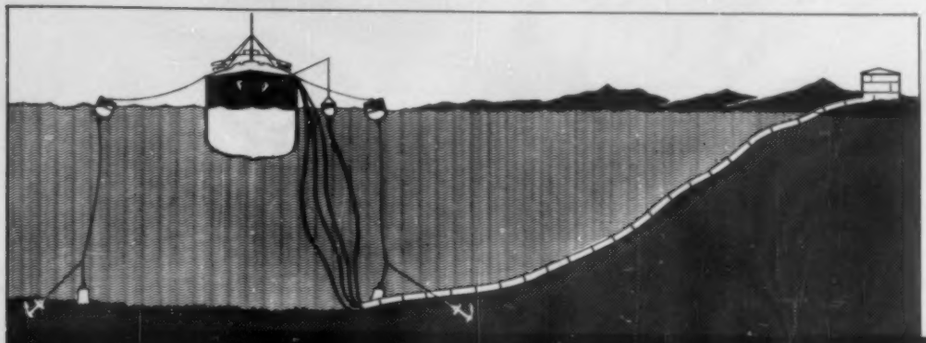


Solving the SUPERTANKER Problem

Simple, methodical sea-loading facilities engineered and installed by Collins Construction Company can make it possible to load and unload the largest tankers direct to your storage facilities —at a fraction of the cost of harbor improvement.

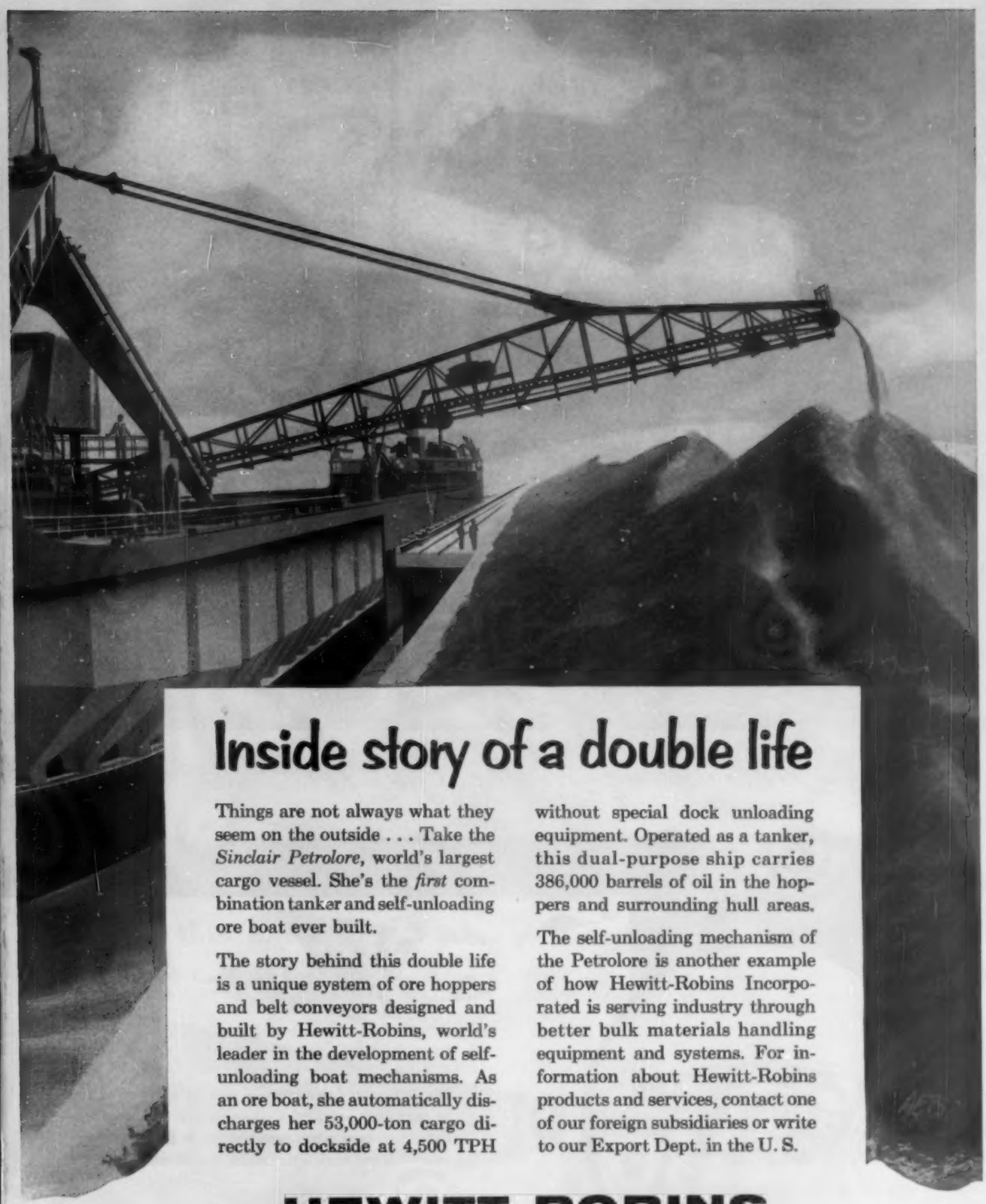
Diagrammed below is a sea-loading facility provided by Collins Construction Company in less than six months. This installation permits the largest tankers—and there will be approximately 70 of them by 1960—to maneuver to mooring and loading stations under their own power.

In a fraction of the time, at a fraction of the cost of harbor improvement, facilities for fully-loaded tankers of 60 ft. draft can be provided. Eliminate the need for topping-off or partial unloading to smaller vessels by means of this safe, economical and permanent installation designed, engineered and proved in service by the Collins Construction Company.



COLLINS CONSTRUCTION COMPANY PORT LAVACA, TEXAS

CANADA, Montreal, P. Q., Hewitt-Robins (Canada) Ltd., 2052 St. Catherine St., W.
ENGLAND, London W 1, Hewitt-Robins (Great Britain) Ltd., 8 Cavendish Place
FRANCE, Paris 2e, Hewitt-Robins Internationale, 9 Boulevard des Italiens
NETHERLANDS, Amsterdam, Hewitt-Robins (Holland) N. V. Vondelstraat 57
SOUTH AFRICA, Johannesburg, Robins Conveyors (S.A.) Ltd., P.O. Box 4736
EXPORT DEPARTMENT: New York 17, N. Y. Hewitt-Robins Incorporated, 370 Lexington Avenue



Inside story of a double life

Things are not always what they seem on the outside . . . Take the *Sinclair Petrolore*, world's largest cargo vessel. She's the *first* combination tanker and self-unloading ore boat ever built.

The story behind this double life is a unique system of ore hoppers and belt conveyors designed and built by Hewitt-Robins, world's leader in the development of self-unloading boat mechanisms. As an ore boat, she automatically discharges her 53,000-ton cargo directly to dockside at 4,500 TPH without special dock unloading equipment. Operated as a tanker, this dual-purpose ship carries 386,000 barrels of oil in the hoppers and surrounding hull areas.

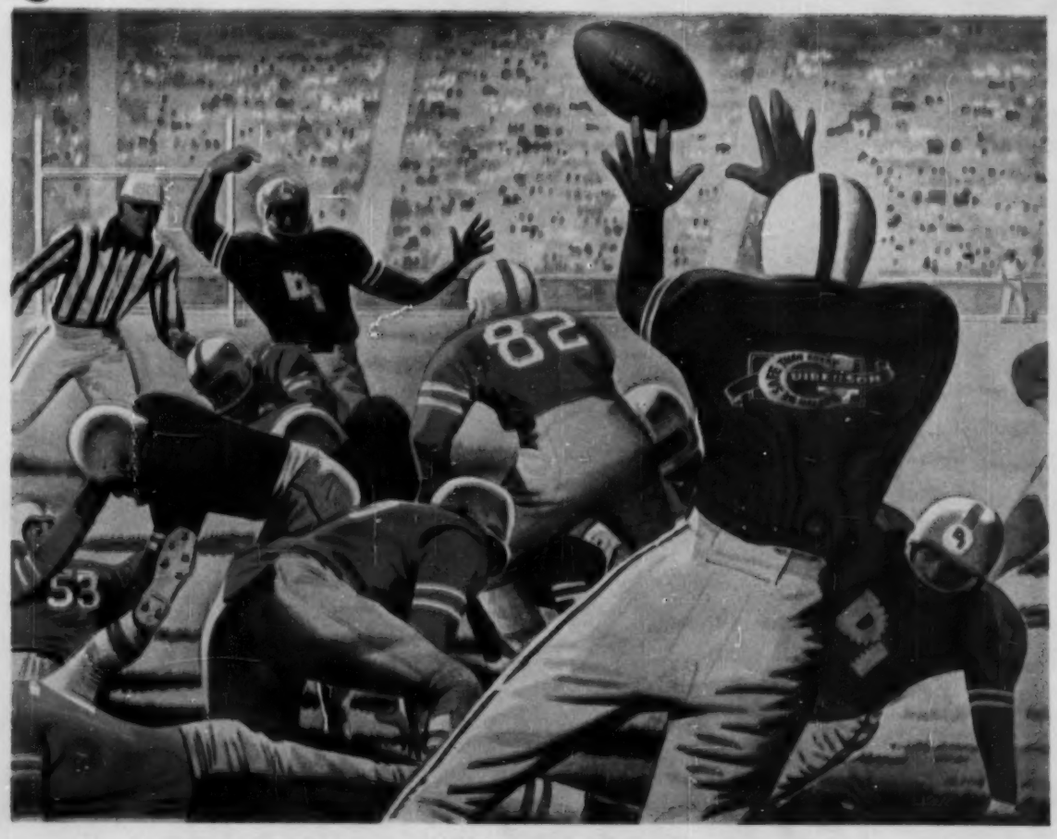
The self-unloading mechanism of the Petrolore is another example of how Hewitt-Robins Incorporated is serving industry through better bulk materials handling equipment and systems. For information about Hewitt-Robins products and services, contact one of our foreign subsidiaries or write to our Export Dept. in the U. S.

HEWITT-ROBINS

INTERNATIONAL DIVISION

STAMFORD, CONNECTICUT, U.S.A.

INDUSTRIAL HOSE • CONVEYOR BELTING • VIBRATING EQUIPMENT • DESIGN, MANUFACTURE, ENGINEERING AND ERECTION OF COMPLETE BULK MATERIALS HANDLING SYSTEMS • JONES POWER TRANSMISSION EQUIPMENT



Announcing—Another Gain for Dresser

SAFE THAN SORRY BETTER BE
UIBERSON

The Guiberson Corporation — with its outstanding line of specialized oil field tools — joins Dresser Industries to form an even greater combination of Dresser plus + teamwork and experience serving the petroleum industry.

THE DRESSER INDUSTRIAL TEAM SERVES THE GROWING OIL

the Dresser Badges of Merit plus+

CLARK

CLARK BROS. CO., Olean, New York —Gas turbines, engines, and reciprocating, centrifugal and axial flow compressors—gas, steam, electric and diesel driven.

DRESSER IDECO

DRESSER-IDECO COMPANY, Columbus, Ohio—Radio and television broadcasting towers, steel buildings, aircraft hangars, electric power substations.

DRESSER MANUFACTURING DIVISION

DRESSER MANUFACTURING DIVISION, Bradford, Pa.—Pipe line couplings, pipe repair sleeves and clamps, weldments, forgings, welding fittings, flanges, rings.

GUIBERSON

THE GUIBERSON CORPORATION, Dallas, Tex.—Oil tools: packers, anchors, workover equipment—drilling heads, blowout preventers, tubing blocks, hooks, swivels, kellys, savers, unions. Gas lift equipment. Molded rubber products.

IDECO®

IDECO, Dallas, Tex.—Hydrair* and Power Rigs; Full-View* Masts; substructures; single, dual and Drive-In Rambler Rigs; blocks, swivels, rotaries; mud pumps; petroleum equipment and supplies.

LANE WELLS

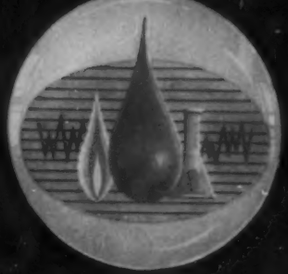
LANE-WELLS CO., Los Angeles, Calif., Houston, Tex., Oklahoma City Okla.—Electric and Radioactivity Well Logging, Koneshot* perforating and bullet perforating, packers and bridging plugs.

Magcobar®

MAGNET COVE BARIUM CORP., Houston, Tex.—Magcobar* and Magcogel* drilling muds and other specialized oil well drilling fluids and chemicals.

PACIFIC®

PACIFIC PUMPS, INC., Huntington Park, Calif.—Centrifugal pumps for refineries, power stations, pipelines, and chemical plants; plunger pumps for oilwells.



ROOTS-CONNERSVILLE

ROOTS-CONNERSVILLE BLOWER DIVISION, Connersville, Ind.—Rotary positive blowers, gas pumps, centrifugal blowers, exhausters, vacuum pumps, and positive displacement meters.

Security

SECURITY ENGINEERING DIVISION, Dallas, Tex., Whittier, Calif.—Rock bits, reamer rock bits and hole openers; reamers, casing scrapers and Neo-Red rubber stabilizers.

SIE

SOUTHWESTERN INDUSTRIAL ELECTRONICS CO., Houston, Tex.—Seismograph systems and instruments—electronic, electro-mechanical. Computers—analog and digital; recording systems. Special transformers, reactors.

*Trademark registered

put this DRESSER *plus+* team to work for you!

You receive a bonus of extra value whenever you are served by any one of the Dresser companies. Each Dresser operating unit provides the research, engineering, manufacturing and service applications for its particular specialties. *All* work together to provide the combined experience and facilities of the world-wide Dresser industrial team. This inter-company teamwork offers a bonus in greater experience and technical knowledge – backed by the extensive Dresser facilities – in the customer's specific industry. This intangible but important factor is known throughout the world as the Dresser plus +... the mark of superior equipment and services for the oil, gas, chemical, electronic, and general industry.

Dresser's world-wide engineering experience in many industries plays a major role in the creation of new developments and improved technological methods. No other single company provides the same broad range of equipment and services. The Dresser plus + is a symbol for the superior quality of equipment and technical services which have become the standard of comparison in industries the world over!

DRESSER INDUSTRIES, INC.

EQUIPMENT AND TECHNICAL SERVICES

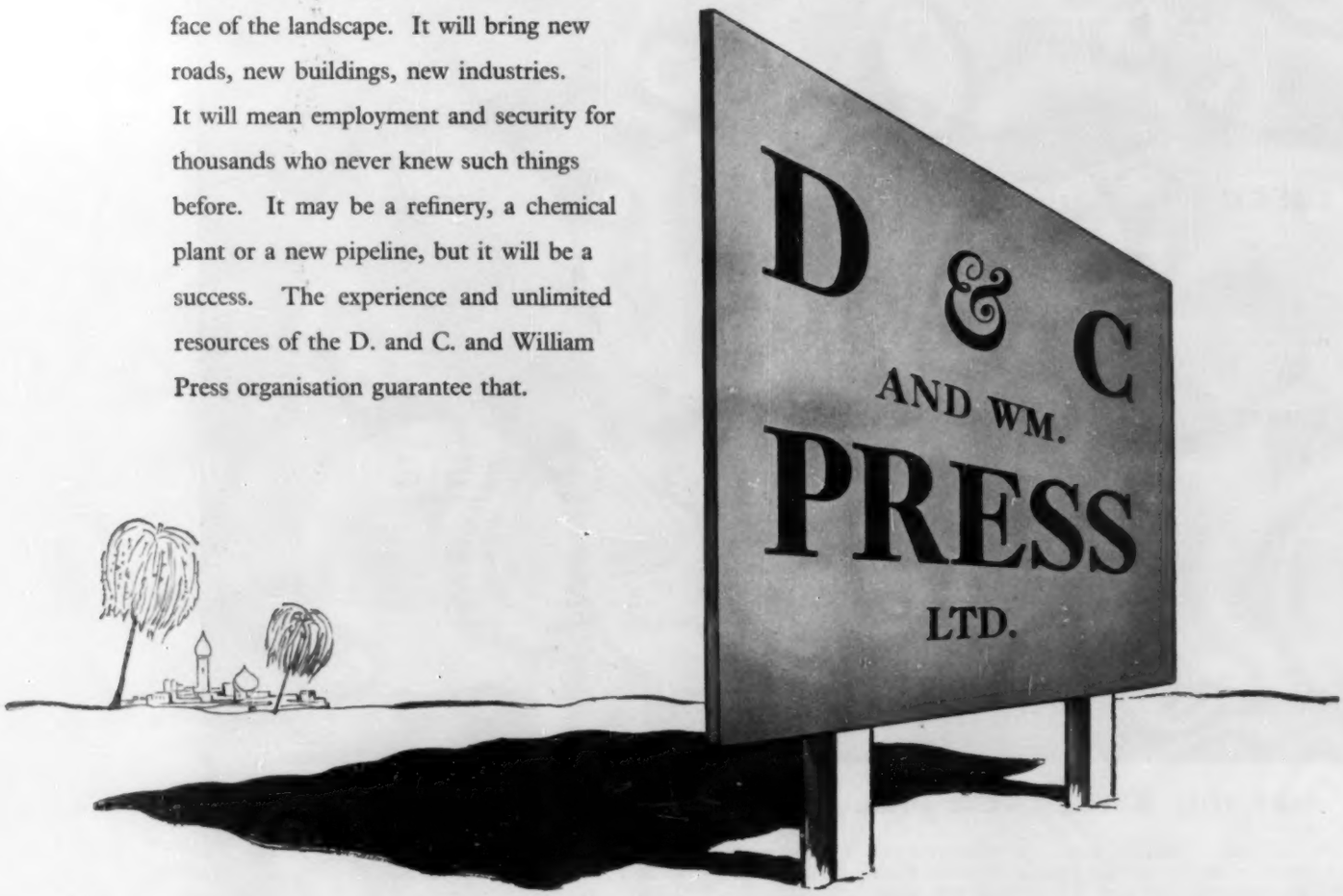
OIL • GAS
CHEMICAL
ELECTRONIC
INDUSTRIAL

POST OFFICE BOX 718 • REPUBLIC NATIONAL BANK BUILDING • DALLAS 21, TEXAS

GAS, CHEMICAL AND ELECTRONIC INDUSTRIES — EVERYWHERE

Shadow of a new project

It will be a big project. It will change the face of the landscape. It will bring new roads, new buildings, new industries. It will mean employment and security for thousands who never knew such things before. It may be a refinery, a chemical plant or a new pipeline, but it will be a success. The experience and unlimited resources of the D. and C. and William Press organisation guarantee that.

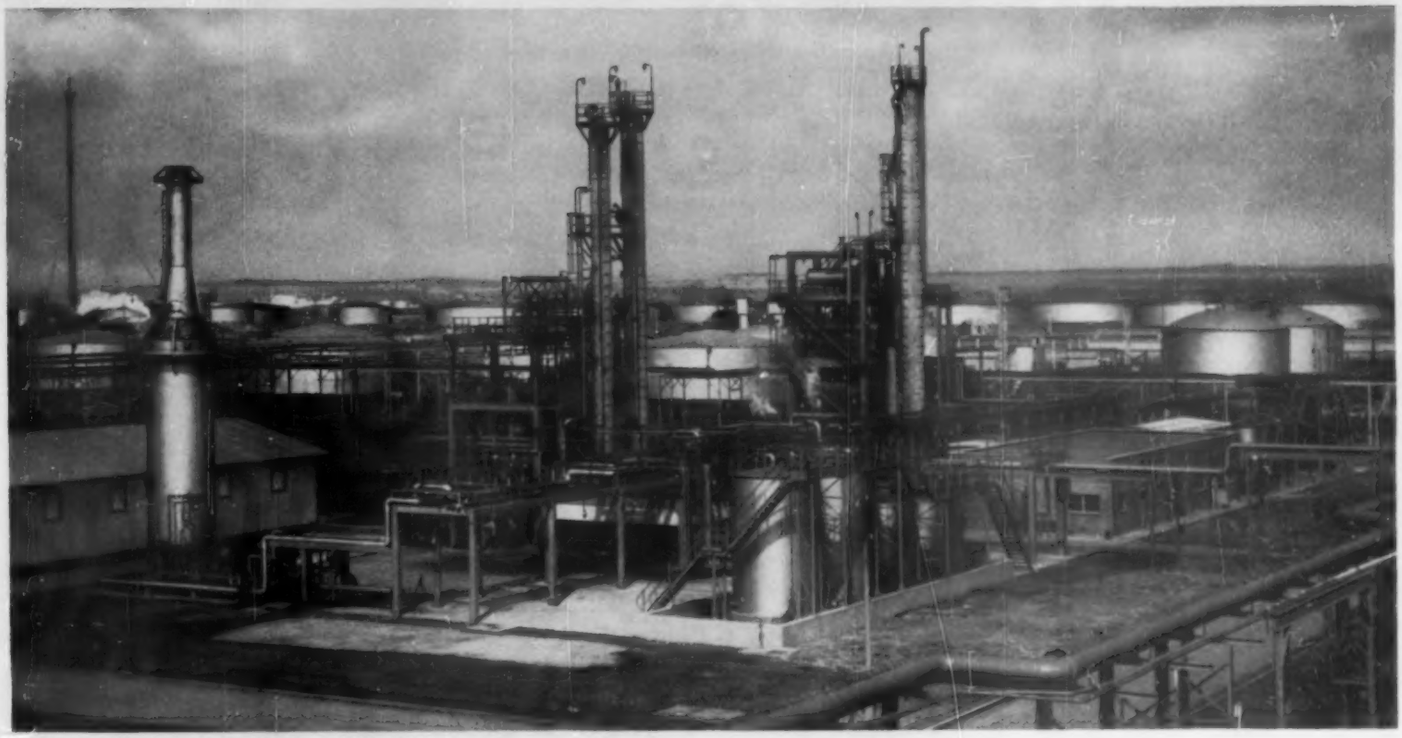


Civil, mechanical and chemical construction engineers

20, ALBERT EMBANKMENT, LONDON, S.E. 11 Tel: RELiance 7685 Grams: DEMCOPRESS, LONDON
Canadian Office: Ross-Meagher Ltd., 9 Echo Drive, Ottawa 1, Ontario.

TA 9095

DETERGENT ALKYLATE
. . . pure and simple



Detergent Alkylate Plant, Grange Chemicals Limited, Grangemouth, Scotland.

PURE AND SIMPLE . . . Key words in the highly competitive detergent field where outstanding product purity and plant operating simplicity mean worthwhile marketing and production advantages.

Both qualities characterize the new plant of Grange Chemicals Limited which was designed and constructed by Stone & Webster Engineering Corporation and its affiliate E. B. Badger & Sons Limited (London) using basic process information developed by the Oronite Chemical Company. Brought on stream smoothly, this plant was producing better than specification product, at design rates, in record breaking time. Contributing to this performance were several process and mechanical features developed especially for this project by Stone & Webster.

STONE & WEBSTER ENGINEERING CORPORATION

AFFILIATED WITH E. B. BADGER & SONS LIMITED (LONDON)

New York Boston Chicago Pittsburgh Houston Los Angeles San Francisco Seattle Toronto

Equipping for comfort and full-time efficiency

Economically and far-sightedly the great Companies with installations throughout the world have equipped with Dunlopillo — the modern cushioning that means more comfort and better work where people are employed in trying climates. For office, transport and canteen seating, in seating and mattresses for staff quarters, Dunlopillo is a long-term investment. Its air-conditioned latex foam withstands constant use without loss of resilience, without sagging, or "breaking down", and it is unaffected by extreme temperatures or humidity throughout its long life of undiminished comfort.

with

Dunlopillo

and all its advantages— *not affected by temperature or humidity • moth, germ and vermin-resisting • cannot create dust or fluff • never needs airing • cannot sag or form lumps • never needs re-making • silent in use*

DUNLOP RUBBER CO. LTD., (DUNLOPILLO DIVISION), WALTON, LIVERPOOL, ENGLAND · ASSOCIATED COMPANIES AND DISTRIBUTORS THROUGHOUT THE WORLD
AD/53

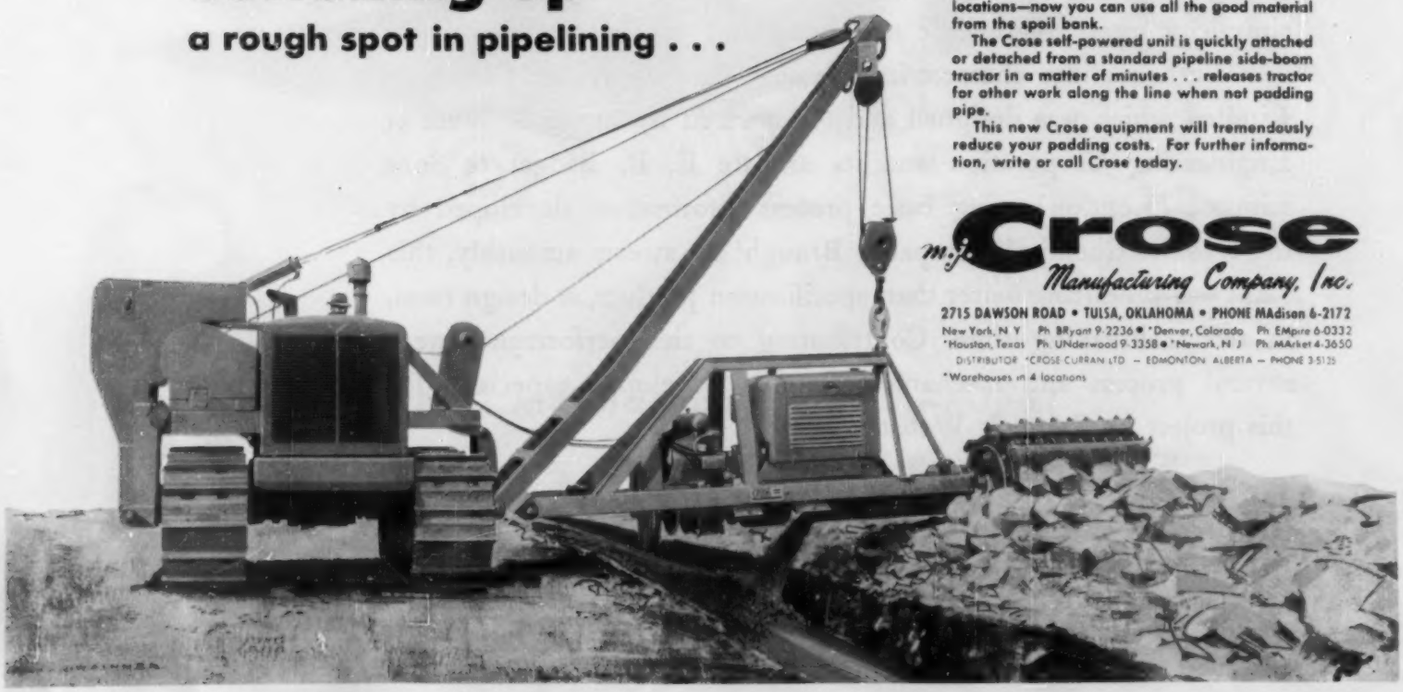
THE NEW CROSE PIPELINE DITCH PADDER

softening up
a rough spot in pipelining . . .

Forward Thinking Crose Engineering has produced another machine to reduce pipeline construction costs! This ditch padder has a screening head and conveyor that completely pads coated pipe with selected soft, rock-free soil. Sharp, pipe-damaging rocks are eliminated. No longer must padding material be hauled in from distant locations—now you can use all the good material from the spoil bank.

The Crose self-powered unit is quickly attached or detached from a standard pipeline side-boom tractor in a matter of minutes . . . releases tractor for other work along the line when not padding pipe.

This new Crose equipment will tremendously reduce your padding costs. For further information, write or call Crose today.



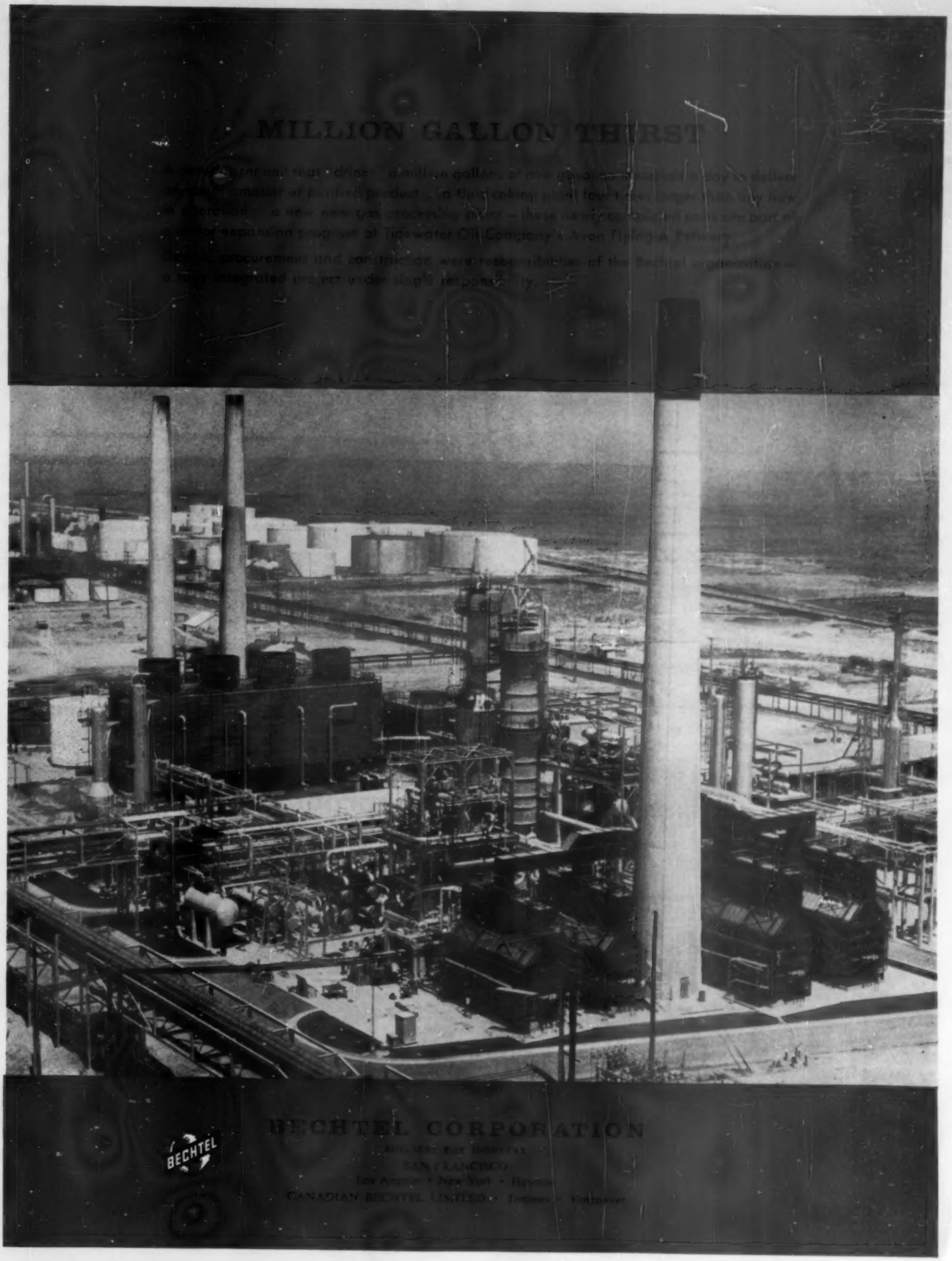
M. J. Crose Manufacturing Company, Inc.

2715 DAWSON ROAD • TULSA, OKLAHOMA • PHONE MAdison 6-2172

New York, N. Y. Ph. BRyant 9-2236 • *Denver, Colorado Ph. EMpire 6-0332
*Houston, Texas Ph. UNderwood 9-3358 • *Newark, N. J. Ph. MArket 4-3650

DISTRIBUTOR *CROSE-CURRAN LTD. — EDMONTON, ALBERTA — PHONE 3-5125

*Warehouses in 4 locations


MILLION GALLON THIRST
BECHTEL CORPORATION
SAN FRANCISCO
BECHTEL

ADVERTISERS' INDEX

(Advertising Agencies in Italics)

John Allen & Sons (Oxford) Ltd. 59
Howard Bull Advertising

A. E. Ames & Co. Ltd. 6
MacLaren Advertising Co. Ltd.

Arabian American Oil Co. 93

Audley Engineering Co., Ltd. 20
Marsteller, Rickard, Gebhardt & Reed, Inc.

Baash-Ross Tool Company 67
Ruthrauff & Ryan, Inc.

E. B. Badger & Sons Limited 89
Thames Advertising Service Ltd.

Bechtel Corporation 91
Ryder & Ohleyer, Inc.

Bell Aircraft Corporation 81
Comstock & Company

Bigelow-Liptak Corp. 3
Gray & Kilgore, Inc.

Frederick Braby & Co., Ltd. 58
Allardyce Palmer, Ltd.

British Petroleum Co., Ltd. 73
S. H. Benson, Ltd.

The Butterley Co., Ltd. 1
Rowlinson-Broughton

Cameron Iron Works, Inc. Cover II
Boone & Cummings

The Cape Asbestos Co., Ltd. 65
Taylor Advertising Ltd.

Catalytic Construction Company 46
Doremus-Eshleman Company

Chicago Bridge & Iron Company 7
Russell T. Gray, Inc.

Cities Service Oil Company 14
Ellington & Co., Inc.

Collins Construction Company 83

M. J. Crose Mfg. Co., Inc. 90
Paul Locke Advertising, Inc.

Dominion Engineering Co., Ltd. 66
Cockfield, Brown & Co., Ltd.

Dowell Incorporated Cover IV
MacManus, John & Adams, Inc.

Dresser Industries, Inc. 86-87
Don L. Baxter, Inc.

Dunlop Rubber Co., Ltd. (Duniopillo Div.) 90
Charles F. Higham Ltd.

E. I. du Pont de Nemours & Co., Inc. 17-18
Charles L. Rumrill & Co., Inc.

Federal Telephone & Radio Company 5
J. M. Mathes, Inc.

Foster Wheeler Corporation 21
Marsteller, Rickard, Gebhardt and Reed, Inc.

General American Transportation Corp. 94
Weiss and Geller, Inc.

The General Electric Co., Ltd. of England 78, 92
Kingscott Ltd.

Geolograph Company 70
Lowe Runkle Company

Gulf Oil Corporation 74
Ketchum MacLeod & Grove, Inc.

Halliburton Oil Well Cementing Company 28
Hill & Christopher, Inc.

Herb J. Hawthorne, Inc. 62
Brennan Advertising Agency

Hewitt-Robins, Inc. 84-85
Fuller & Smith & Ross, Inc.

Hurst-Nelson & Co., Ltd. 79
Osborne-Peacock Co. Ltd.

International Harvester Export Company 75
McCann-Erickson, Inc.

International Paints, Ltd. Cover III
Mayfair Advertising, Ltd.

M. W. Kellogg Company 22
Fuller & Smith & Ross, Inc.

Richard Klinger, Ltd. 69
R. F. White & Son, Ltd.

The Lummus Company 26
G. M. Basford Company

Manning, Maxwell & Moore, Inc. 9
Fuller & Smith & Ross, Inc.

McCullough Tool Company 2
Raymond O. Perry Advertising

Metropolitan-Vickers Electrical Co., Ltd. 76
Technical & General Advertising, Ltd.

Moon Brothers, Ltd. 64
Donald MacDonald (Advertising) Ltd.

Lee C. Moore Corporation 19
Paul Locke Advertising

Nordstrom Valve Division
Rockwell Manufacturing Company 20
Marsteller, Rickard, Gebhardt & Reed, Inc.

Oil Center Tool Company 23
Rives, Dyke & Company

The Ralph M. Parsons Company 77
Dozier Eastman and Company

D. & C. and Wm. Press, Ltd. 88
Taylor Advertising, Ltd.

Procon, Incorporated 12
Sam J. Gallay Advertising

Ruston & Hornsby Ltd. 15
Industrial Publicity Services, Ltd.

Schlumberger Well Surveying Corporation 45
Rives, Dyke & Company

Shell Oil Company 24
Kenyon & Eckhardt, Inc.

Socony Mobil Oil Co., Inc. 16
Compton Advertising, Inc.

Southwestern Industrial Electronics Company 25
Publication Service Company

Peter Spence & Sons, Ltd. 63
Ripley Preston & Co., Ltd.

Standard Oil Company (New Jersey) 10
McCann-Erickson, Inc.

Standard-Vacuum Oil Company 13
Sam J. Gallay Advertising

Stone & Webster Engineering Corporation
Badger Process Division 89
Thames Advertising Service Ltd.

Union Carbide International Company 11
National Export Advertising Service, Inc.

Universal Oil Products Company 70-71
Sam J. Gallay Advertising

Vokes Genspring Limited 64
Crane Publicity, Ltd.

Williams Brothers 80
Scot's Advertising

Woodfield Hoist & Associated Industries, Ltd. 82
KS Advertising, Ltd.

flameproof push, lamp and switch unit

G.E.C.

SINGLE LITEALARM

This indicator light unit, which is a new addition to our range of Litealarms, can also be used as a push lamp device for initiating or cancelling an alarm. Extra switching facilities can be incorporated for remote control of two separate circuits. Full details are available on request.

THE GENERAL ELECTRIC CO. LTD. OF ENGLAND

Something to smile about

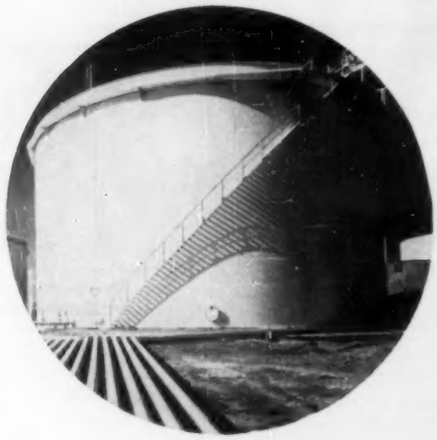
Young Tarish certainly has something to smile about. The delicious, crunchy dates were a gift from a date farmer. Like any city boy, Tarish bin Hashim Zawawi was delighted with his trip to the country.

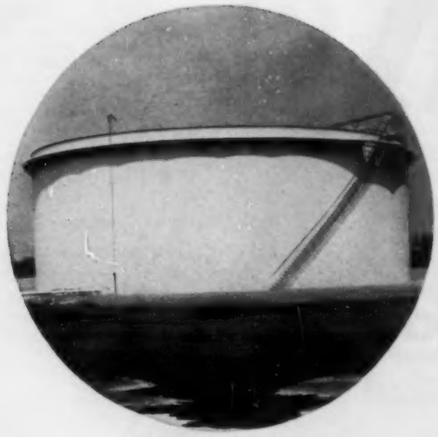
Young as he is, Tarish has seen a lot happen in Saudi Arabia—a lot to be proud about. Living in the bustling seaport city of Jiddah, he's watched buildings go up one after another, new stores and factories blossom, and motor traffic get heavier and heavier.

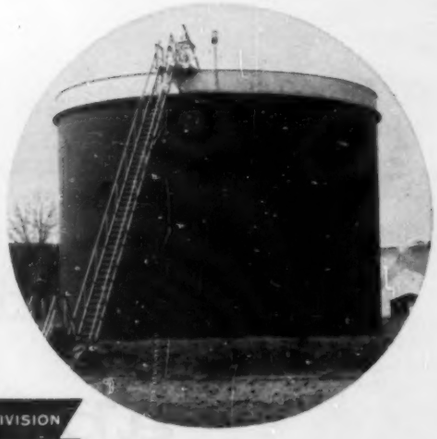
When he got home from his trip, he talked on and on about the modern equipment at the date farm, the brand-new service stations along the Mecca highway and the homes being built wherever he went.

Tarish can look ahead to more and more progress in Saudi Arabia. The progressive oil industry, by constantly developing the land's rich oil resources, is giving a powerful impetus to the healthy growth and strength of the whole country.

ARAMCO · ARABIAN AMERICAN OIL CO.
DHAHRAN, SAUDI ARABIA · NEW YORK, N. Y., U.S.A.







PROVEN SAFE, ECONOMICAL,
DEPENDABLE IN USE!
USED ALL OVER THE WORLD

EXPORT DIVISION
GENERAL AMERICAN
TRADE MARK

wiggins floating roofs

By GENERAL AMERICAN

The Wiggins roof floats on the surface of a stored product and the triple seal protection turns practically all pumping and standing losses into savings. Simple design keeps maintenance low. Tested and approved under all weather conditions.

Only the Wiggins Floating Roof has all the specifications which 30 years' experience has proven necessary for best performance.

GENERAL AMERICAN
TRANSPORTATION CORPORATION
Export Division: 380 Madison Avenue, New York 17, New York

Write to Export Division for full information and the name of your nearest representative.

LICENSEES

Etablts. Delattre & Frouard Reunis
39, Rue de la Bienfaisance
Paris, France

Breda Elettromeccanica e Locomotive, S. P. A.
Sesto San Giovanni
Milan, Italy

Ashmore, Benson, Pease & Co.
Stockton-on-Tees, England

A. E. Goodwin Ltd.
47 Forsyth Street, Glebe
Sydney, Australia

Sanson Vasconcellos
Comercio e Industria de Ferro S.A.
Rua do Carmo 43-5° Andar
Rio de Janeiro, Brazil

Tsukishima Kikai Company, Ltd.
9, 5-chome, Tsukishima-dori, Chuo-Ku
Tokyo, Japan

Toronto Iron Works Ltd.
629 Eastern Avenue
Toronto, Ontario, Canada

Taiwan Shipbuilding Corporation
P.O. Box 19, Keelung, Taiwan (Formosa)

Paints

specially formulated to meet the exacting conditions encountered in the oil industry . . . paints that are the result of constant research and experiment by International's world wide organization. These International specialties being the ideal medium

for the

protection of storage tanks, pipe lines and refineries against corrosion and climatic conditions are used by

Oil

companies the world over. Full particulars of the International range will be sent on request. International cordially invite any inquiries relating to the painting problems of the oil

Industry

Bulk tinting of paint with a high speed mixer.

International Paints Ltd.

Head Office: GROSVENOR GARDENS HOUSE, LONDON, S.W.1

TELEPHONE: TATE GALLERY 7070 (15 LINES)

TELEGRAMS, INLAND: CORROFOUL, SOWEST, LONDON. OVERSEAS: CORROFOUL, LONDON

1881 1956

MAIN FACTORY IN U.K. FELLING-ON-TYNE

ASSOCIATED FACTORIES IN

AUSTRALIA	SYDNEY	GERMANY	HAMBURG	NEW ZEALAND	WELLINGTON
BRAZIL	RIO DE JANEIRO	ITALY	GENOA	SPAIN	BILBAO
CANADA	MONTREAL	ITALY	TRIESTE	SWEDEN	GOTHENBURG
CANADA	VANCOUVER	JAPAN	KOBE	U.S.A.	NEW YORK
DENMARK	COPENHAGEN	MEXICO	MEXICO CITY	U.S.A.	SAN FRANCISCO
FRANCE	LE HAVRE	NORWAY	BERGEN	VENEZUELA	MARACAIBO

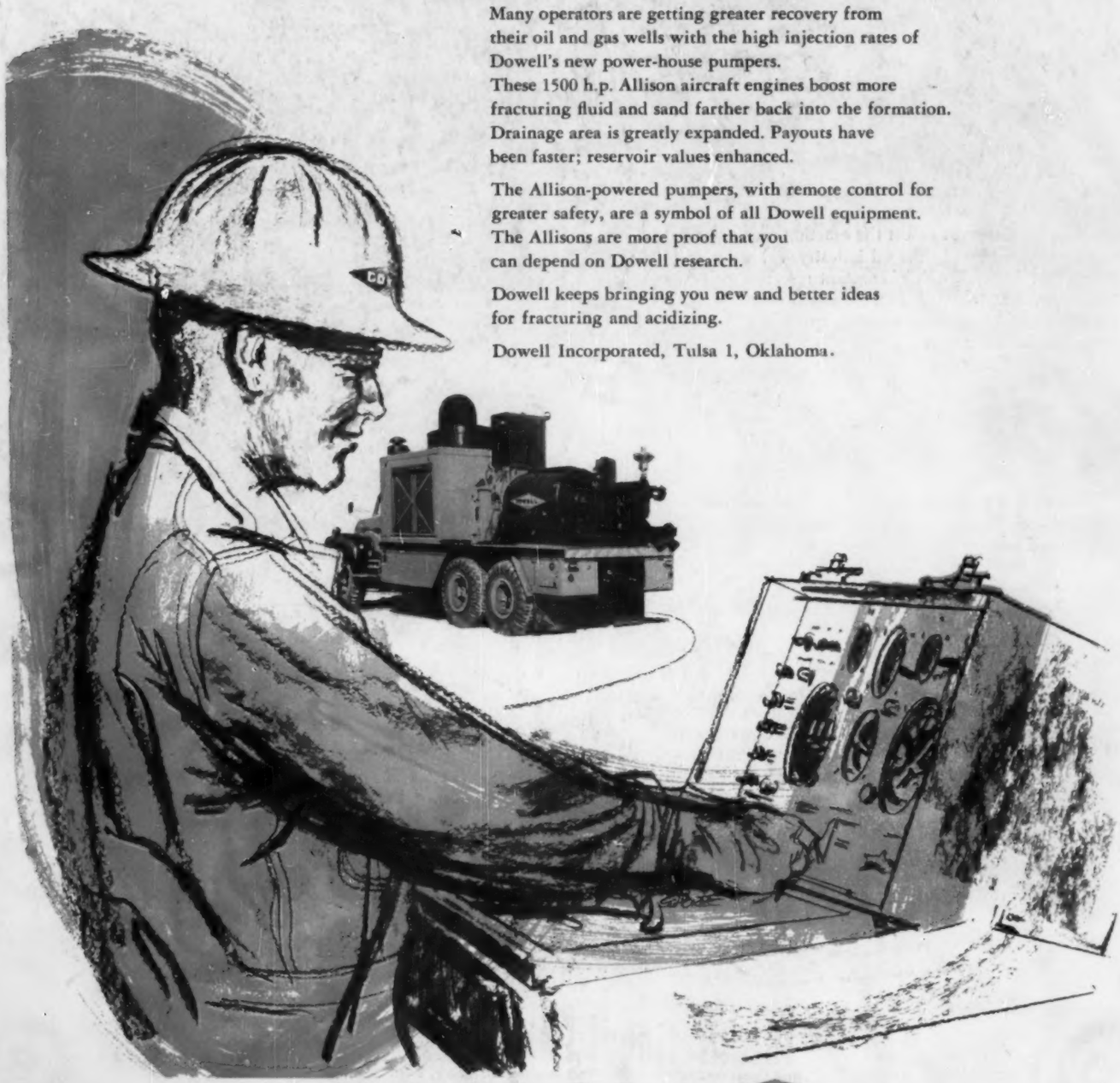
More power for greater recovery

Many operators are getting greater recovery from their oil and gas wells with the high injection rates of Dowell's new power-house pumpers.
These 1500 h.p. Allison aircraft engines boost more fracturing fluid and sand farther back into the formation. Drainage area is greatly expanded. Payouts have been faster; reservoir values enhanced.

The Allison-powered pumpers, with remote control for greater safety, are a symbol of all Dowell equipment. The Allisons are more proof that you can depend on Dowell research.

Dowell keeps bringing you new and better ideas for fracturing and acidizing.

Dowell Incorporated, Tulsa 1, Oklahoma.



Services for the oil industry

DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY